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Rock Products
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Motor-Truck Operated Quarry

The Dolomite Products Co., Rochester, N. Y., Has Interesting Operation with Several Unique Features

THE case of the Dolomite Products Co., Rochester, N. Y., of which John Odenbach is president, general manager and moving spirit, presents an interesting example of the "triumph of mind over matter." It was the writer's good fortune to pay a visit here early in March after a lapse of seven years since the plant was first put into operation (see ROCK PRODUCTS, August 28, 1918.) During that period, without radical change in the design of the crushing plant itself, an operation intended to produce from 150 to 200 tons of pulverized limestone a day has been converted into a real crushed-stone operation producing around 800 tons per day with extraordinarily little equipment. It should be added that the original operators were not successful in their project and only since Mr. Odenbach has taken hold has it been a paying proposition.

The principal changes that have made this possible are an intelligent development of a quarry face, the addition of a couple of crushers (a No. 8 and a No. 5 Kennedy) and facilities for stocking the stone after it is made. Originally the quarry was opened immediately at the foot of the incline to the crusher. Quite an extensive face has been developed some distance from the plant, permitting the use of a Sanderson-Cyclone well drill and heavy shots—blasting away from the plant as the quarry is worked in that direction.

The most unique feature of the quarry operation is the use of three 5-ton White motor trucks for hauling stone from the quarry face to the crusher in place of an industrial railway and steam locomotive, which were first tried. Mr. Odenbach is authority for the statement that these three motor trucks are capable of handling from 700 to 900 tons of stone a day at a cost of approximately $12 each, including gas, oil, drivers' wages, and depreciation allowance, a total of $24 per day for the cost of operating and maintaining the quarry transportation system.

"The Winter's End"—a typical quarry view

He considers this a very efficient method of quarry transportation; and, as the view herewith shows, the quarry is not one that would be considered at all favorable to the use of motor trucks.

At the time the quarry was visited a 90-ton railroad type shovel was being used. However, a new 75-ton Marion electric shovel with crawler treads had been ordered and was expected to be in use early in the season. As the first view with this article shows, the quarry like most pit quarries, needs an annual spring pumping out. To accomplish this Mr. Odenbach has made use of a portable pumping unit, electric motored, using for the truck the chassis of an old motor truck.

Although the quarry is located on the main line of the New York Central R. R., most of its output is shipped by motor truck. For this purpose a fleet of nine Mack trucks is kept. As the plant has very small and inefficient bin storage, most of the stone is stocked in the open, using the motor trucks from the bin to the stock pile and stock-piling with a 40-ton railway locomotive crane, wide gauge. Working with a clam-shell bucket this crane rehandles and reloads the stone, quite efficiently, taking into account that the motor trucks can be thus employed when they would otherwise

General view of the quarry of the Dolomite Products Co., near Rochester, N. Y. The cru and at the extreme right is one of the motor tr

Well drill working back toward the crushing plant

be idle—with the drivers still on the payroll, however.

Mr. Odenbach has some original plans for a large operation here, and if these plans mature, he will have one of the most interesting and original crushed-stone plants in the world. He has already given evidence of his independence of established practices and of his readiness to experiment.

Using Psychology

Before going into the stone business Mr. Odenbach had some considerable experience as a restauranter. Indeed, with two brothers, he is still interested in two of the most popular restaurants in Rochester. This doubtless gives him an insight into human nature and the methods of catering to human beings that he would not otherwise have.

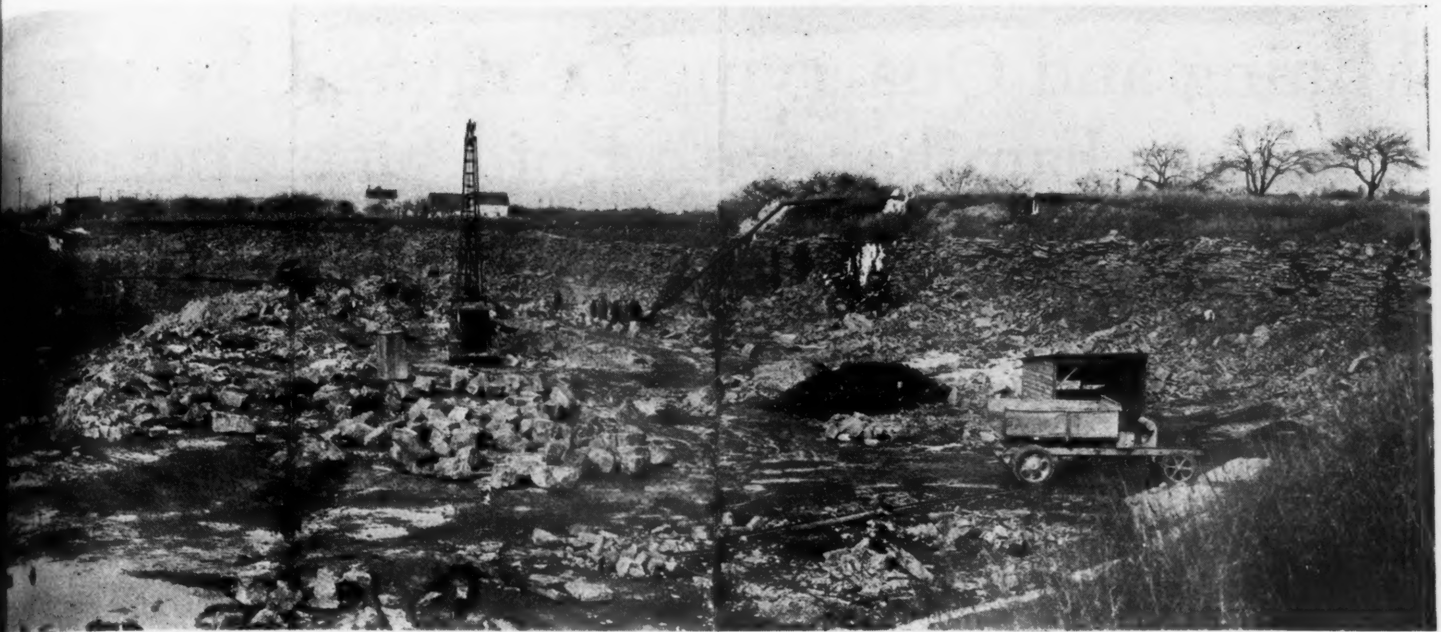
The Dolomite Products Co. doesn't sell "crushed stone." That's too common. Anyone can sell that. It sells "dolomite." The company's trucks all bear this legend in big letters. Probably 99 people out of a 100 don't know what "dolomite" means, but its virtues have been greatly extolled, and they know, or come to know, that the product of the Dolomite Products Co. is crushed stone, but not ordinary crushed stone. It is dolomite with all kinds of reputed and imaginary virtues.

Thus does a crushed stone producer make good use of a practical knowledge of psychology.

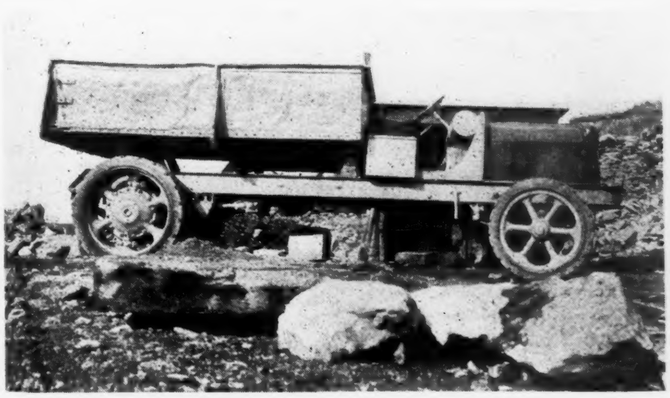
John Odenbach is a firm believer in the crushed stone industry and all its branches. He has gone in for concrete products to use up his fines, but recently his stone business has been so good he hasn't had any fines to use. He looks forward to building up a large industry and has prepared the way by accummulation of enough acreage to last many years. He is not going to be satisfied with a crushed-stone product only. He is a quarry man who can visualize a real future in "dolomite products," and like the editor of Rock Products he is nearly ready to believe the day will come when a dolomite as pure as his will be too valuable a mineral to build roads with.

Portable pumping plant for dewatering the quarry with pipe raised to permit the shovel to work under it

Close-up of truck-mounted pumping unit, showing one way the company makes use of old motor-truck chassis



ant is at the extreme left; in the center the roadway leading to the lower level of the quarry,
d to bring stone from the shovel to the plant



Close-up of motor truck used to carry stone from shovel to plant—specially built all steel bodies

The roadway the trucks have to negotiate to get to the shovel and back again to the plant

Railway type locomotive crane does the stock piling adjacent to the plant

Type of truck used to deliver crushed stone and to carry stone from bins to ground storage

Mining and Quarrying Compared by an Engineer Familiar with Both Operations

Part 8—Summary of Series Begun in the April 19, 1924, Issue of Rock Products—Cost Comparisons

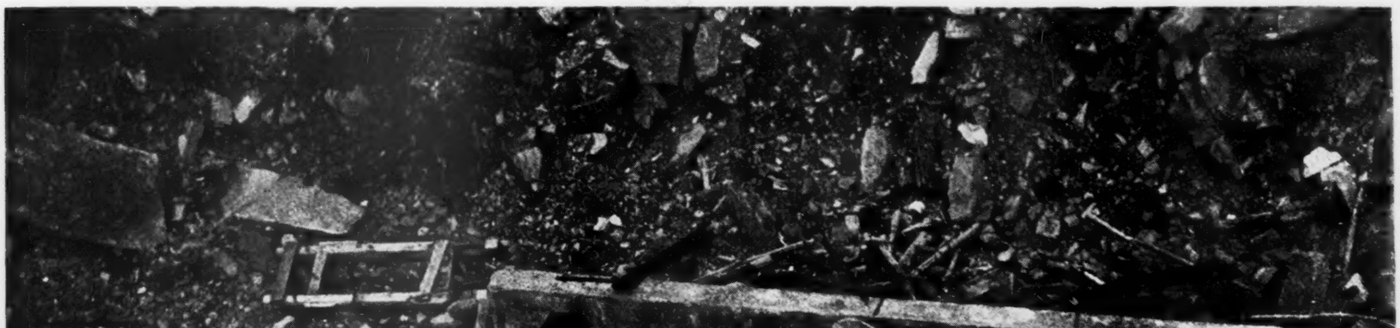
By J. R. Thoenen, Member A. I. M. E.

IN the preceding articles on this subject I have attempted to point out some of the salient points in which mining and quarrying differ as well as those in which direct comparisons can be made. More time and space has been devoted to mining and detailed descriptions of actual mining operations than to quarrying because I feel this phase of limestone production is less known and understood. The open quarry is there for anyone to see who cares to look. Underground operators however, quite properly, are much adverse to showing visitors through their plants.

Strictly speaking the quarry differs greatly from the mine and yet it is interesting to note the number of points in which they are directly comparable.

In general, the operation of the quarry resembles only one underground method—the underhand bench stope. There is an old saying that, "Every mine is a problem in itself." This is amply illustrated by the various methods utilized in mining which have been previously described. The same quotation can be applied to quarries but in a much narrower sense.

Where the miner has a complexity of methods to choose from the quarryman has only different applications of one general system. This undoubtedly tends to constantly increase efficiency because, as that single general system is studied and manipulated by a greater number of individuals there is just that greater chance for reaching the ultimate in economy and lost cost production. If the same simplicity of operation could be applied to mining it is quite likely much greater improvement would result. However the very diversity in the nature of those deposits applicable to mining demands different methods of attack



Entrance to the Bellefonte mine of the American Lime and Stone Co.

which prohibits concentration along any individual system.

In the quarry, rock is broken by large diameter and deep well drill holes as well as the shorter and smaller holes of the piston and hammer drills. The mine however is confined to the latter entirely.

Because of the absence of any need for attention to ventilation in the quarry some explosives can be used which on account of their production of noxious gases would be prohibitory in mines.

Blast holes in quarries are almost invariably drilled vertically downward while in mines they may project in any direction.

When once the rock has been broken, underground and open pit operations enter a more comparable phase. Both use hand methods as well as mechanical shovels of small, and standard types for loading cars. While the steam and gas driven shovel are not adaptable to underground use on account of ventilation, the electric and air operated shovels can be used equally as well underground as on the surface. The mine on a steeply inclined deposit has the advantage of being able to do away with much of either hand or mechanical loading, accomplishing the operation by simple gravity control through chutes.

Within restriction imposed by ventilation underground transportation is practically the same as that on the surface. One exception to this is the use by open quarries of centrally controlled, electrically operated cars, fitted with individual motors. This system however is as yet confined to those operations of great magnitude because of the excessive installation cost. So far such a system has never been applied to mining because of obvious difficulties in observation.

Shaft mines have a hoisting problem which, while really one of transportation has its counterpart in quarry practice in long hauls from pit to crusher, elevation over inclined tramways from the lower pit level, and in some cases in actual structural steel shafts fastened to the side of the pit.

The ultimate comparison between any two divergent methods of operation which is of greatest interest to the stone producer is of course that of tonnages produced per unit of labor, per unit of explosive used, and cost per ton. In these items more or less direct comparisons can be made thanks to the co-operation of many of the plants I have visited during the past year.

From data obtained from a number quarries and mines personally observed by the writer the following average tonnage figures were compiled.

	Tons per man	Tons per lb. of explos.	Tons per ft hole drill
Quarries	18.0	3.19	14.8
Mines	12.7	2.96	1.7

In the above figures under quarries is included well drill performance as well as that of the smaller drills while among the mines the piston and hammer drill only are included. In neither case is secondary blasting calculated in the tonnages per foot of hole drilled. Among the quarries a greater proportion include mechanical shovel loading which probably accounts for the increased labor production. The similarity in the tonnage broken per pound of explosive in the two operations is worthy of note.

The cost figures which I have compiled and which appear below have been taken from a number of open quarries as well as underground mines personally visited, and, from other open pit operations reporting costs through the National Crushed Stone Association and published in the March 8, 1924, issue of Rock Products. In the former case open quarries having little or no overburden costs have been purposely kept in the minority. In the latter case only the average percentage costs of 30 limestone quarries are used and actual dollars and cents costs computed from an assumed average explosive consumption per ton of rock produced and based on the cost of that explosive. This latter is admittedly not an accurate compilation, however the writer believes the figures will not be far from the actual conditions.

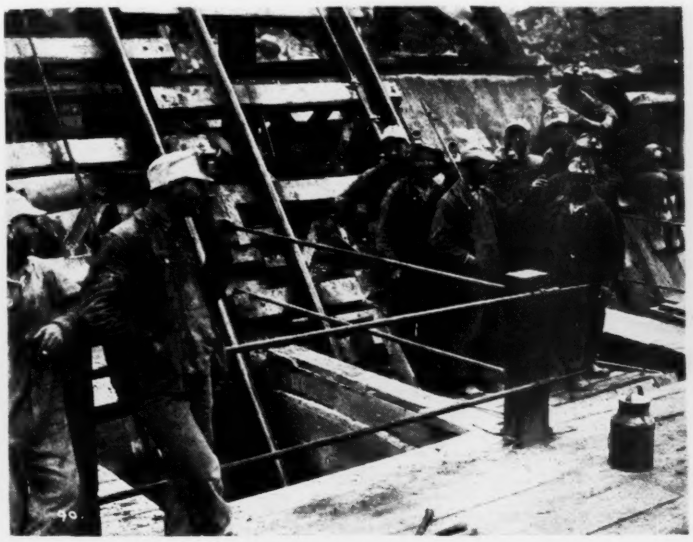
In the compilation of costs from plants visited, detailed costs were obtained in some cases and only total costs in others. Therefore the addition of the component averages will not check with the average total. These costs further do not pretend to cover the entire industry either mining or quarrying, but it is hoped they will throw considerable light on this hitherto rather obscure comparison.

Quoting from the issue of Rock Products of March 8, 1924, 30 limestone quarries averaged 61.7 ft. in height of quarry face and 4.14 ft. in depth of overburden. Based on a total cost of 100%, their average costs were:

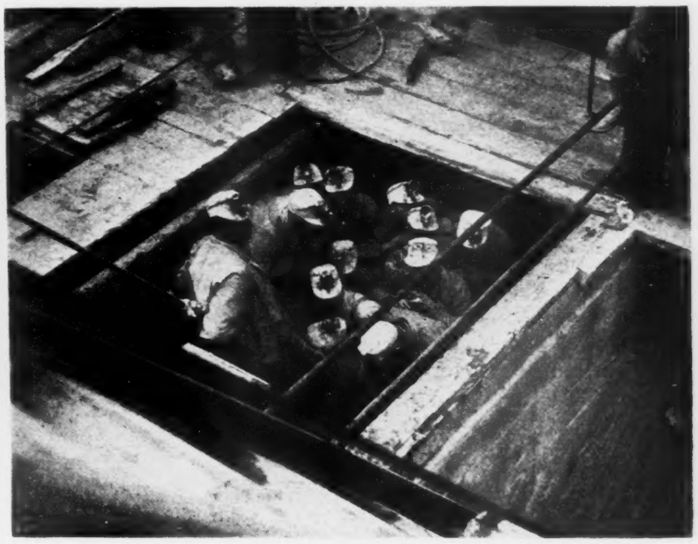
	Per cent
Stripping	3.40
Explosives	8.95
Labor	38.90
Supplies	12.48
Fuel	10.92
Depreciation	11.12
General expense	14.23

In the same issue of Rock Products an eminent authority estimates that three tons of rock produced per pound of explosive used, to be about right for average open-pit quarry conditions in this country. On this basis, and assuming an average cost per pound of explosive to be 18 cents, which will include detonators, fuse, wiring, etc., the foregoing percentage costs are computed to the following dollars and cents costs:

Stripping	$0.0228
Explosives	.0600
Labor	.2608
Supplies	.0836
Fuel	.0732
Depreciation	.0745
General expense	.0954
Total	$0.6703



Group of miners at Bellefonte ready to descend



Car going down into the Bellefonte limestone mine

It is quite obvious that this method of compilation can be applied only where the component figures compose the average of a number of individuals because of the divergence in kinds of explosives used as well as prices; and amounts consumed in obtaining a ton of stone in individual quarries.

It will be noted in connection with the above computation that the average quarry face in these 30 quarries is quite high, while the depth of overburden is correspondingly small; or, in other words, ideal conditions for open-pit operation.

From eight open-pit operations visited by the writer, the average height of quarry face was 61.7 ft., or the same as the preceding average of 30 quarries, while the overburden averaged 26.6 ft., ranging from 2 ft. at one quarry to 75 ft. at another.

From these eight quarries detailed costs were obtained from four, with total and explosive costs from three. From this data the following detailed costs appear:

Stripping	$0.125
Explosives	.091
Labor	.445
Supplies	.048
Fuel	.068
Depreciation	.113
General expense	.064
Total	$0.863

A superficial comparison of the total cost from these seven quarries with that of the previous 30 shows an increase of 19¼ cents per ton of stone for an increase of 22½ ft. of overburden. However, the average cost of overburden removal increased only 10¼ cents per ton of rock, while the labor cost increased 18½ cents.

As previously noted, the sum of the detailed costs does not check with the average total cost in this last computation for the reasons stated. It is only fair to state, however, in view of this increased labor cost that in compiling averages for the 30 quarries and the seven, mechanical and hand-loading operations are included in both.

Combining these two sets of computations, we find the average detailed costs for the 37 quarries to be:

Stripping	$0.035
Explosives	.066
Labor	.282
Supplies	.080
Fuel	.072
Depreciation	.079
General expense	.092
And the average total to be	$0.707

From the detailed costs of ten underground limestone mines I find averages as follows:

Stripping	$0.000
Explosives	.104
Labor	.471
Supplies	.076
Fuel	.061
Depreciation	.093
General expense	.099
Total	$0.904

At these mines the height of face averaged 29.5 ft., which, it will be observed, is less than 50% of the average open-pit height, while the overburden varied from a minimum of 25 ft. of loose dirt to a maximum of 500 ft. of various stone and shale strata.

A comparison of total costs shows the open quarry to have the advantage by practically 20 cents per ton. However, as has been stated repeatedly in these articles, it is not the intention to imply that the underground mine could compete in costs with ideal open-quarry conditions. It would perhaps be more fair to compare costs of those seven quarries noted above as having increased overburden charges with the ten mines. In this case the differential in favor of the quarry is only 4.1 cents.

It is to be regretted that costs could not be obtained from a few more mines using standard size steam shovels underground. With these costs in hand, the differential in favor of the quarry might easily be greatly reduced. In fact, a comparison of detailed costs as obtained by the writer from four only of the above seven with the ten mines shows a differential in favor of the mines of 5 cents per ton.

All costs as computed above are for stone as and when delivered at the quarry.

The comparative effects of overburden removal, weather conditions, rock storage, year-round production, and purity of product have all been previously discussed in these articles, and I will not go into them further except to recall that each has its elements of advantage in mining over quarry operation, although it would be impossible to say to just what extent they affect the cost sheet.

Summing up, it may be of interest to state that observed quarry costs ranged from a minimum of 43 cents per ton to a maximum of $1.52 per ton, while mine costs ranged from a minimum of 63 cents to a maximum of $1.15 per ton.

British Columbia's Non-Metallic Minerals Await Development

AN article, written by a mining engineer on the non-metallic mineral resources of British Columbia and the possible expansion of the industry in the development of the resources of the province, occupied a position of considerable prominence in a Vancouver (B. C.) daily paper recently.

The non-metallics produced there at present consist chiefly of cement, clay products, lime for chemical and agricultural purposes, crushed stone, sand and gravel and building stone. These industries represent an annual value of between $2,500,000 and $3,000,000 according to F. K. Mason, the author of the article.

Among the resources awaiting development are deposits of fluorspar, magnesite, talc, gypsum and bentonite.

Fuller's Earth in 1924

THE largest output of fuller's earth on record is that for 1924, as reported by the Department of the Interior through the federal Geological Survey working in co-operation with the State Geological Surveys in Alabama, Florida, Georgia and Illinois. Thirteen operators in six States reported that 177,994 short tons of fuller's earth were sold in 1924, valued at $2,632,342, or $14.79 a ton. This output is 19% greater than that of 1923, but it is more than four times that of 1914. The value of the output for 1924 was also the largest ever recorded. It was 17% greater than that of 1923 and 5% greater than that of 1920, the previous year having the record of greatest value. It was more than six times as large as that of 1914. Since 1920 there has been a steady decline in the average price per ton, the price in 1924 being nearly $5 lower than that in 1920, the year of highest average.

The South continues to produce the larger part of the output. Georgia was the leading State in output and value, displacing Florida, which has occupied that position since the beginning of the industry. Florida was second and Texas was third in output and value. These three states reported 93% of the output and value in 1924. The producing States, named in the order of their output, were Georgia, Florida, Texas, Illinois, Massachusetts, and Alabama.

Garfield Rock Asphalt Company Resumes Operation

THE Garfield Rock Asphalt Co., whose mines are located in Breckenridge county, near Garfield, Ky., has resumed operations employing about 50 men. The plant has a capacity of 200 tons per day but is not yet running at full capacity.

While the company's mines are located near Garfield, the crushing plant is in Garfield near the track line of the Louisville, Henderson & St. Louis Railway Co. A track is being laid from the crusher to the mines and will be finished in about a week. The finished product is loaded on freight cars right at the crusher.

Paul Compton is president of the company and Dr. Milton Board is secretary and treasurer, both men are of Louisville, Ky. D. S. Sprigg is the plant superintendent.

One Order of 200 Carloads of Agricultural Limestone

AN order for 200 carloads of agricultural limestone was placed by the Boone county, Ill., Farm Bureau with Dolese and Shepard Co., of Chicago, whose plants are at La Grange, Ill., and Gary, Ind.

Boone county has eight townships in it and probably uses more limestone for agricultural purposes per township than any county in the state. James Kline is the county agent. The price of this large order was 65 cents per ton, the regular county rate for agricultural limestone.

A "Concrete Products City" Near Indianapolis

Granite Sand and Gravel Co. Is Surrounded with Concrete Products Plants and Other Industries to Which Is Supplies Aggregates

AGGREGATE producers the country over are much interested in concrete products. The output of concrete products has doubled every year for the past four years, which shows that a great and increasing market for the finer sizes of aggregate has sprung up. Many producers have gone into the products business but others have found it more profitable to enter into an alliance with the makers of block and tile, furnishing the aggregate and a site for the plant, preferring this to building up a selling organization for or under contract, and its business has grown so that it is building a considerable addition to the plant to take care of it. Across the street, that might be called the "Main street" of the city, is the Indianapolis Concrete Products Co.'s plant in which concrete blocks and pipes are made. Nearest of all to the sand and gravel plants is a central concrete mixing plant which delivered wet mixed concrete to any part of Indianapolis. This is run by the Emulsified Asphalt Co., which also runs a business of supplying mixed the United States the writer has yet seen.

It is based on three operative principles which the company worked out from its long experience in the business. They are:

1. The cheapest way to excavate the material from this particular deposit is by a suction dredge.
2. The cheapest way to transport the material 1,000 to 1,500 ft. is by barging.
3. Continuous plant operation, especially in winter, demands that material be put in storage. Underwater storage

Panorama of the "concrete city" surrounding the sand and gravel plant of the Granite Sand and Gravel Co., Indianapolis, Ind.

products and forming a new set of business contracts.

One of the most successful arrangements of this kind is found in Indianapolis on the ground of the Granite Sand and Gravel Co. There are five plants of different sorts using the aggregate produced by the company, which are located on sites close by the plant and leased to them by the company. Together the plants form a rather imposing looking industrial center and the name "Concrete City" has been given it by some of the people who live nearby.

One of these plants is run by the Independent Block and Cement Co., which makes block and garden furniture. Another is that of Rath Construction Products and Cement Co., which makes "Duntile," "Picabb" tile, the flat slabs of the Sawyer system and other building products. It uses most of its production in buildings which it constructs for sale asphalt paving ready to be laid upon the streets. The fine sand from the deposit is used in making this asphalt mixture, as well as some of the coarser material.

The Granite Sand and Gravel Co. produces not only the aggregate for these plants but a lot more that it sells for highway work and general commercial uses. It delivers with a fleet of 5-ton trucks, 14 Macks and two Pierce-Arrows. It maintains its own garage and repair shop for these and not only keeps them in good mechanical shape but neat and well painted. The big dark green trucks, with the company's name painted in yellow letters on the side, make an excellent advertisement for the company as well as an efficient delivery system.

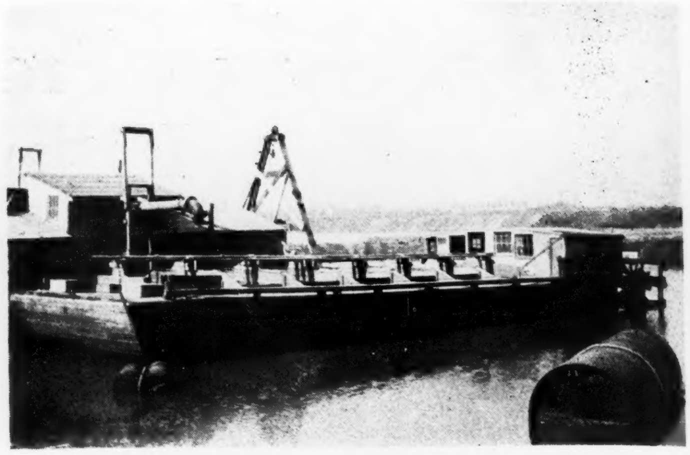
This may be interesting, but more interesting to the gravel producer is the method by which the bank material is excavated and handled. Indeed it is one of the most unique production systems in is better, and the cheapest way to get it in such storage is to drop it out of the barge, while the cheapest way to recover it from storage is by the use of a cableway and dragline bucket.

In order to carry out the scheme the company found it necessary to design—or perhaps invent would be nearer the truth—a new type of self propelling barge which has proven much more efficient than non-propelling barges and towboats.

The deposit is flat and has two to three feet of top soil above it. Water level is perhaps 20 ft. below the ground level and the sand and gravel extend about 45 ft. below the surface of the water. This makes an ideal deposit to work with a suction dredge.

The deposit is not stripped. The material is washed, first when it is pumped on the barge, again when it is dropped into underwater storage and recovered by the dragline and a third time when it

Special bottom dump barge



Another view of barge

passes through the screens. No matter how much clay and top soil is present at the start the material is bound to be clean at the finish.

The dredge has a 70x30 ft. hull on which is mounted a 12-in. American Manganese Steel Co.'s pump of the low-lift dredging type. This is direct-connected to a 150 hp. General Electric motor. The discharge pipe is brought up about 10 ft. above the deck to a Tee from which branch lines go to the port and starboard sides. Heavy flap valves are arranged to close the ends of these branch pipes and are used alternately according to whether the boat is pumping to one side or the other.

A Swintek travelling suction screen is used to protect the pump from the entrance of large stones. There are not many of these boulders but enough to interfere seriously with the pumping if the Swintek or a similar device is not used.

Barges are brought first to one side of the dredge and then the other. The run is so short that a barge has ample time to make the round trip, discharge its load and return to the position for pumping while the other barge is being filled.

These barges are unique in the sand and gravel industry. Each has a 70x30 ft. hull divided into 7 compartments by bulkheads. Between each of these bulkheads is a hopper with a bottom discharge door. Air spaces on either side of the hopper provide buoyancy.

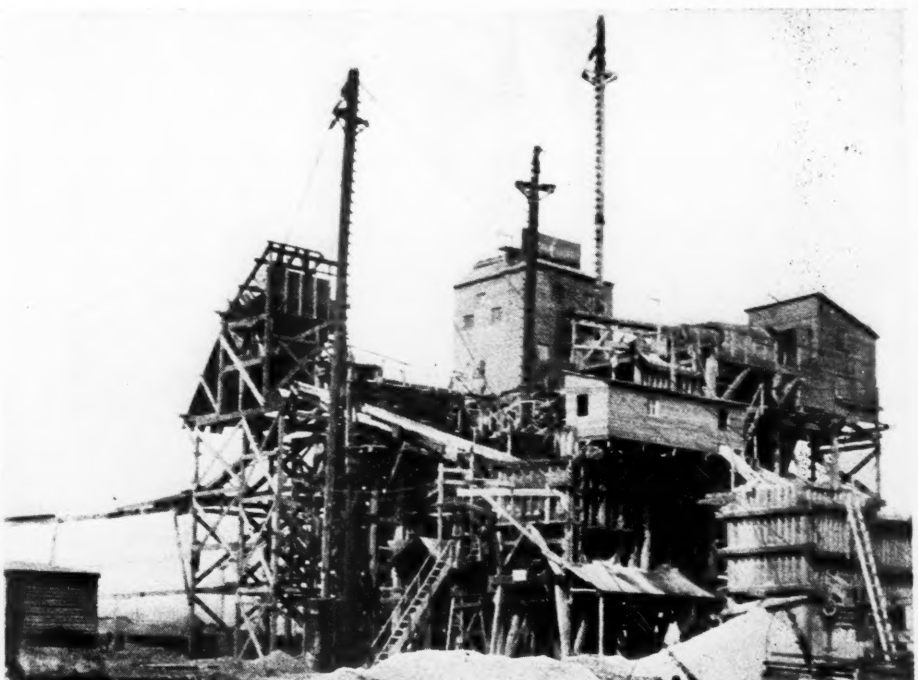
The doors which close these hoppers have a chain bridle which is attached to a chain that is wound on a 5-in. pipe on top of the bulkheads. This pipe is set in bearings, like a shaft. It is turned by a gear system at the end, winding the chains about the pipe as it turns, thus closing all the doors of the hoppers. When the doors are closed a latch in a notch holds the pipe from turning. The latch is knocked out of the notch when the boat is to be discharged and the weight of the sand and gravel causes the doors to fall, unwinding the chains from the pipe. Discharging takes only a few seconds. The boat rises so fast when the load is dropped that it appears to be jumping out of water.

The propelling system is the unique feature of these barges. It consists of two Fordson tractor engines, each of which is connected by a chain drive to an 8 ft. stern paddle wheel, 5 ft. wide. Each engine and wheel forms an independent unit. In turning, one wheel is run forward and the other in reverse so that the boat spins as though it were turning on a pivot. There is no rudder, all the steering being by running the paddle wheels forward or reverse as desired.

The barges handle about as easily as a row boat with this propelling system. As a barge is filled it moves the hoppers under the pump discharge one after the other. As soon as the last hopper is filled it backs out, turns around in what appears to be a very narrow space and heads for the storage space. Arriving there the load is dropped and the barge backs around and returns to the opposite side of the boat with plenty of time to spot the first hopper below the pump discharge before the barge on the other side is filled.

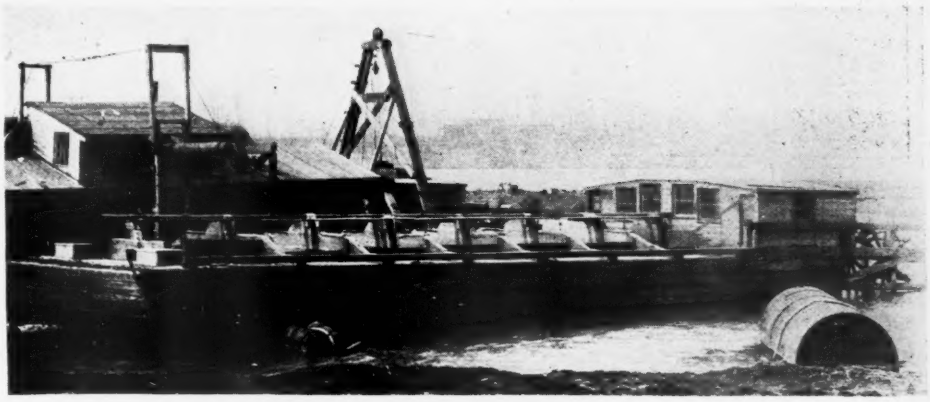
Each barge holds 80 yds., which with this material is around 120 tons.

From the storage pile the material is excavated and brought to the washing plant by one of two 1½ yd. Sauerman draglines. These work at a very short range with a high mast, which makes a



General view of the South plant—Granite Sand and Gravel Co.

Head end of 12-in. pump dredge showing how suction is handled



Close-up of self-dumping barge

steep angle, and that means a quick return trip for the bucket. Consequently the capacity is greater than would ordinarily be obtained from a rig of this size. Both buckets are operated by 90 hp. Sauerman hoists of the type developed by the Sauerman Co. for cableway dragline work.

Although this may seem a complicated system for getting the material to the plant an analysis will show that the amount of power and labor required is small. The dredge has a 150 hp. motor. Ordinarily, where pumping is through a long shore line, a 350 hp. motor is connected to the pump. The material has

Small dredge which pumps excess of sand from storage space in pond

to be conveyed from 1200 to 1500 ft. (estimated), which is getting to the limit of a single pumping. A relay pump would have to be installed if barges were not used, which would mean another 250 or 300 hp.

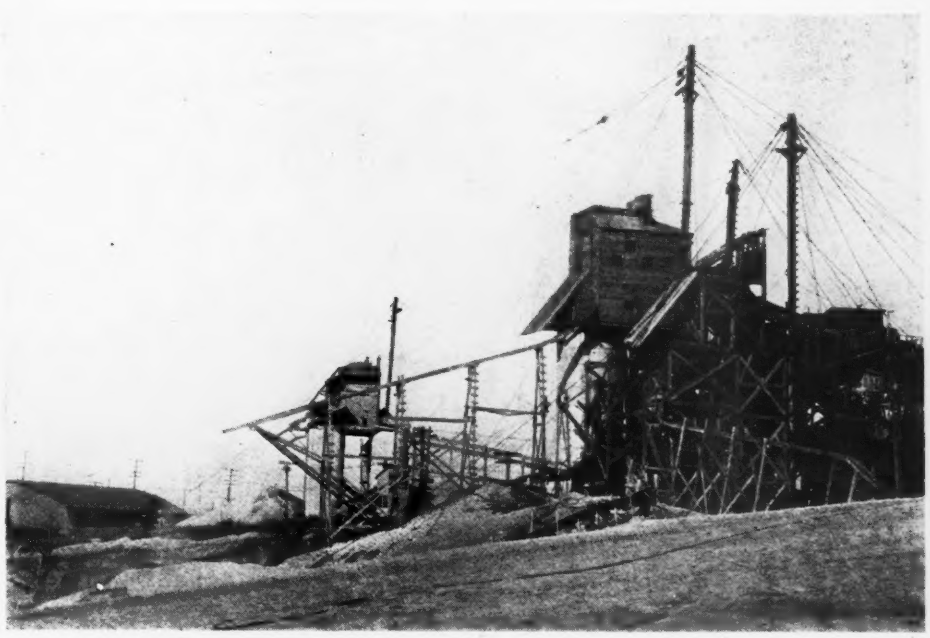
The Fordson tractor engines which propel the barges use little fuel as they work only a small part of the time. The dragline takes considerably less power than a pump would require to raise the sand to the top of the plant, as the pump would have to raise a lot of water in addition to the sand and gravel. As to labor, one man is required on the dredge, one on each of the barges and one for the operation of the dragline.

The alternative to such a system would be that described as being used by the Menantico Sand and Gravel Co., Millville, N. J. (in Rock Products for February 7, 1925); that is stripping the ground with a derrick and clamshell and side-casting into the water where the sand and gravel has been taken out, pumping to underwater storage and repumping to a shore plant. Such a system would use more power and the same labor as the system just described.

In addition, the Granite company's system has some decided advantages in cleaning the material. Another advantage is that it permits the storage of products as well as bank run material. Excess gravel or excess sand are merely run back to the lake and when either is needed the dragline bucket picks it up and puts it through the screens and into the bins.

The dragline bucket discharges into a hopper which has a griggly of rails above The material flows from the hopper through two spouts. One of these leads to a Webster revolving screen which has 2-in., 1⅛-in., ⅝-in., ⅜-in. and ¼-in. perforations. The oversize material goes to a Fort Wayne No. 9 jaw crusher, the crushed material going to the gravel bins by a conveyor. The other sizes are sent to bins from which they are loaded into trucks or railroad cars.

The other spout leads to a set of gravity screens. The first of these is a 1x⅝-in. slot screen, the oversize of which goes to a 1½-in. round hole screen slanted in the same direction as the first screen. The undersize (with the water) goes to a ¼-in. screen and the undersize of that



The two plants of the Granite Sand and Gravel Co.

Plant of the Rath Construction Co. adjoining sand and gravel plant

Concrete cubes to determine "yield" of various aggregates

to a Dull Cone. The cone discharges into a swivelled chute which can be turned three ways, into a block mixture bin, a concrete mixture bin or into cars. Sizes from the screens above are added to the Dull Cone discharge when a block mixture or a concrete mixture is to be made.

These gravity screens are set above concrete silos, recently built. The silos are provided with an effective drainage system so that the material contains only the minimum of water when it is loaded into cars or trucks.

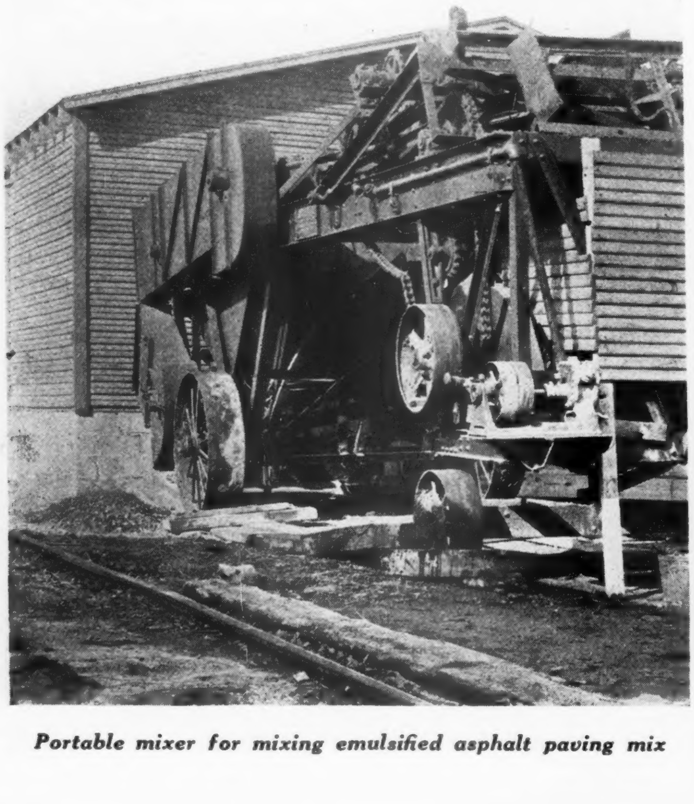
The operation so far described has been that at the south plant of the two plants operated on this ground. The north plant was undergoing repairs at the time it was visited. This plant was built last year and it is one of the best designed plants for use with a cableway dragline that has come to the writer's notice.

This plant has 6 concrete silos each 50 ft. high and 14 ft. in diameter. They are set in two rows about 16 ft. apart and the space between them is roofed over so that trucks can drive in and be in the dry while they are being loaded. Spouts with segmental gates on the outside of the silos may be used to fill cars. The total bin capacity is 1200 cu. yd.

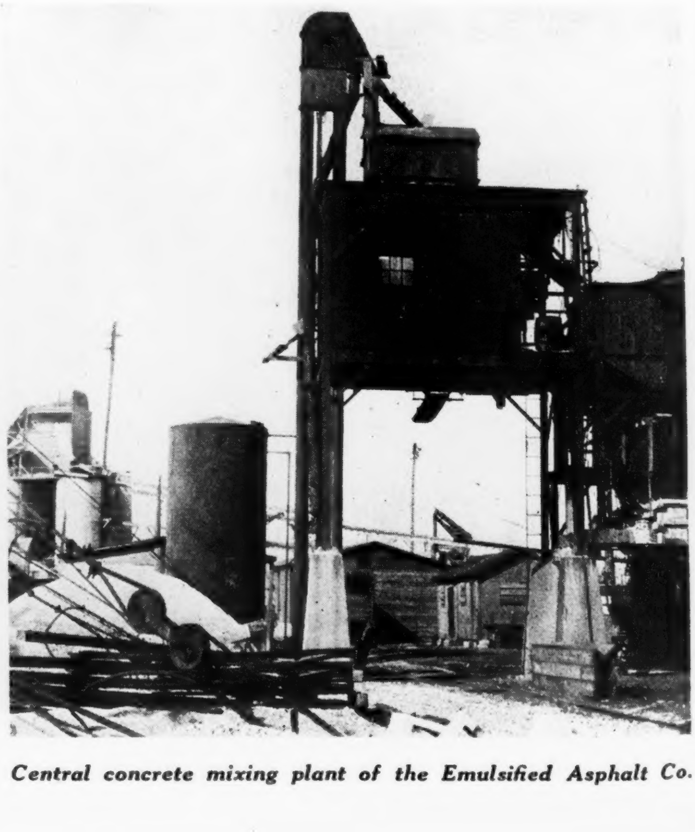
These silos form a firm and rigid support for the dragline mast, which is placed at about the center of one of the rows. In front of the mast is the hopper into which the bucket discharges and below the hopper is the gravity screening system and the crusher for the oversize.

The gravity screening system is like that just described in connection with the south plant. There is first a ⅝-in. x 1-in. slot screen that separates the material on an intermediate size. The oversize goes as before to a 1½-in. round hole screen, which makes what is practically a 1-in. product, and the undersize to a sand screen making a roofing gravel and sand for its products. The sand goes to two Dull cones for dewatering.

The setting of the gravity screens in both plants is one of the best arrange-



Portable mixer for mixing emulsified asphalt paving mix



Central concrete mixing plant of the Emulsified Asphalt Co.

ments of such screens that has been noted. The splitting on an intermediate size reduces the headroom required considerably. The use of slot screens in the place of round hole or square mesh screens gives increased capacity for the same area. The screens are not large; about 6 ft. long and 3 ft. wide. Set at the proper angle, as these seem to be, such screens give very little trouble from blinding.

This north plant is a "straight" dragline plant, the material for it being dug and conveyed by the cableway dragline bucket.

A problem with both plants, and indeed with all the plants in this part of Indiana, is what to do with the excess of sand. At the south plant the problem is solved by pumping the excess away to a worked out portion of the lake whenever it accumulates. At the north plant it is run back to a part of the pond which has been worked out, a pipe supported on a trestle serving as a waste flume. The arrangement of launders above sends all or a part of the sand to the Dull cones, the remainder going to the pond. Of course such sand may be easily recovered when it is needed.

In both plants the water for washing is furnished by De Leval 8-in. centrifugal pumps direct-connected to 50 hp. General Electric motors. There is a 5-in. American Deep Well Pump Co.'s pump direct-connected to a 25 hp. General Electric motor which is used as an auxiliary.

The north plant is now being used largely for the production of asphalt sand. This fine sand lies in a deep strata under the coarser sand and gravel so it is available as the sand and gravel are worked out. It is expected that the north plant will be altogether employed in the production of asphalt sand in the future.

The Granite Sand and Gravel Co. also operates other plants in Indiana. The offices of the company are in the Union Trust building in Indianapolis. W. K. Miller is president of the company, John F. Barnhill is vice-president, Fred D. Stilz is secretary and treasurer and George V. Miller is manager.

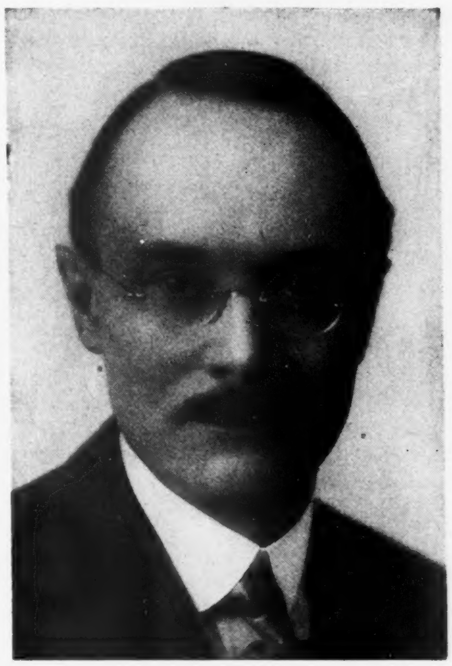
New River Gravel Plant in California

A GRAVEL plant to cost $150,000 will be established at the mouth of the Russian river at Jenner, Calif., by the Russian River Development Co. The company has secured a permit to dredge a channel from Jenner to Duncan's Mill, a distance of eight miles, and to use the gravel taken from the river bed for building material.

A dredge, which has been built at San Francisco at a cost of $50,000, will begin actual operations in the latter part of March, local newspaper dispatches report. The company will build a jetty with timber to protect barges, which will be loaded directly from the dredger.

Paul C. Van Zandt Credited with Japanese Sand and Gravel Development

PAUL C. VAN ZANDT, formerly chief engineer of the Asano Cement Co., now chief engineer of the Ideal Cement Co., and affiliated plants, Denver, Colo., is credited in the March issue of the *Sauerman News* with having started the sand and gravel industry in Japan as a real industry, such as we know it in this country. Every reader knows that the Japanese portland cement industry owes a great deal of its de-



Paul C. Van Zandt

velopment to Mr. Van Zandt, but that he is the father of the Japanese sand and gravel industry is news to most of us, at least.

In 1919, Mr. Van Zandt, accompanied by H. Iritani, chief mechanical engineer of the Asano company, paid a brief visit to America in connection with the purchase of a quantity of new cement mill machinery, and while here they inspected some representative sand and gravel plants. The outcome was that the Asano company asked for bids on a complete washing plant and a 1½ cu. yd. Sauerman cableway with 90 ft. steel mast to be installed on the Tamagawa River where the company was working a huge gravel bar with coolie labor.

It is estimated that this plant does the work of 200 to 300 coolies. Previously, the gravel was dug by hand, screened in a hand sieve, and carried in two baskets, suspended from the ends of a pole across the shoulders of a coolie, who walked up a plank and emptied the contents of the baskets into a wagon which carried the gravel to a gondola car waiting on the railroad that runs along the banks of the river.

The plant's output is chiefly used for road dressing and aggregate for concrete. The market price ranges around 40 yen per cubic tsubo, f. o. b. Tokio, which figures about the same as $2 per cu. yd.

Mixing Sand by Prescription in California

"SANDY" PRATT, the Pacific coast sand and crushed rock producer, who has built up a large business by advertising his product in unusual ways, now offers to make sand by prescription. His letter regarding it, sent to prospective consumers follows:

February 21. 1925

Dear Sirs:

We enclose a sample of Prattco Amber Mixed Sand.

This statement means more than you probably realize and if you will examine the sample, you will be convinced that Prattco Amber Mixed Sand (50% of No. 2—fine Prattco Amber, and 50% of No. 4—coarse Prattco Amber) is an absolutely perfect sand.

The great value of this sand is that we mix the coarse (No. 4), and the fine (No. 2), in a proportion you or your particular job requires. You can have 50% of No. 2 (fine) and 50% of No. 4 (coarse). If you find that the mixture is short of fines, we add more of the fine sand, or if you want more coarse sand, then we can add all the coarse sand your little heart desires.

Believe it or not, at one time we were making mixtures of fine and coarse sand for three of the largest users of sand in California. One concern used a mixture of half coarse and half fine sand. The second firm used a 60%-40% mixture and the other fellow had us mix 75% of coarse sand with 25% of fine sand. All three engineers were made happy and, no doubt, each had a sand absolutely perfect for his particular job. Anyway we made them all happy by giving them just what they asked for. We can do the same for you.

The T. I. Butler Co. (sometimes called Pacific Gravel Co.) is now completing bunkers at its yard—7th and Berry Streets, (center of San Francisco) for the excusive storage of our Prattco Amber Mixed Sand (a perfect mixture of fines and coarse). You can buy a yard or train load from this progressive firm. Butler will also carry in his bunkers, Prattco Amber No. 4 (coarse), and Prattco Amber No. 2 (fine) sand.

"SANDY" PRATT.

Making sand by prescription is not altogether new. One of the largest sand companies in the United States, when asked for sand for a particular purpose sends a sample of what it considers best for that purpose, but offers to make whatever is required in the way of grading provided the sample is not satisfactory.

Proportioning Concrete for a Specified Strength

Method of Determining the Actual Quantities of Moist Aggregate Required to Give Dry Weights for Mixing Concrete

By R. R. Litehiser
Railways Bureau Portland Cement Association

THE effect of moisture in increasing the volume of a given amount of sand all out of proportion to the amount of moisture present has been often described. It is known that this increase in volume varies with the amount of moisture and that maximum bulking occurs with a moisture content of 5% (by weight of dry sand). With a moisture content of 5% in the sands tested, the increase in volume above standard measurement amounted to over 40%, varying with the coarseness of the sand. It is readily apparent, then, that ordinary measurement on the job, where a moisture content of 3 to 5% is quite common, will result in obtaining widely varying amounts of sand in different batches which are intended to have the same proportions. As uniform quality and strength in concrete are dependent on definite amounts of each of the ingredients of the mix, viz., water, cement, fine and coarse aggregate, allowance must be made for bulking of sand when damp or wet. Furthermore, in tables of proportions for specified strengths, the quantities of fine and coarse aggregate are given under conditions of standard measurement. To use these tables, therefore, variable field measurement of the aggregates must be reduced to standard measurement.

The American Society for Testing Materials, basing its action on the results of thousands of tests, prescribes the conditions of standard measurement in obtaining the unit weight of an aggregate. The sample must be room dry. The standard measure should be metal and have its height and diameter approximately equal. For fine aggregate its capacity may be 1/10 cu. ft., but for coarse aggregate its capacity should be ½ or 1 cu. ft. The aggregate is placed in the measure in three approximately equal layers, each layer being tamped or rodded 25 times with a bullet-pointed metal rod ¾ in. in diameter and 18 in. long, and any excess material scraped off when the measure is full. Aggregates so measured are said to be "dry, rodded." When "dry, rodded," a representative sample of an aggregate has a practically constant weight per cubic foot. Measurement in a "dry, rodded" condition is therefore standard.

There are three general methods of proportioning the ingredients in a concrete mixture. They may be proportioned by volume, by weight, or the sand may be measured in an inundated condition. How to obtain concrete of a specified strength by each of these methods will be discussed in turn.

Proportioning by Volume

Measuring the ingredients by volume is the oldest and most prevalent way of proportioning water, cement, fine and coarse aggregate, in a concrete mixture. So general is this practice that 1:2:4 or 1:2½:5 concrete is always understood to mean proportions by volume and measurement of the fine and coarse aggregate just as found on the job in a loose condition and containing whatever quantities of moisture may be present. Not only have these volumes been measured in a crude manner, but the even greater effect of bulking of the sand, due to the moisture contained, has generally been neglected. Such measurement of the aggregate will result in considerable variation of the actual amount placed in a batch.

It is obviously impractical to even think of measuring the aggregates for each batch in the field in a "dry, rodded" condition. Simple tests, however, made on the job will determine the amount of each aggregate measured as found in a damp, loose condition, necessary to make a cubic foot when "dry, rodded." With this information the engineer, inspector, or concrete foreman is ready to determine the field proportions or "field mix" for concrete of the strength specified. Basic proportions may be taken from Bulletin 9 of the Structural Materials Research Laboratory, "Quantities of Materials for Concrete."* These basic proportions, in which the volumes of the aggregates are expressed in a dry, rodded condition, are termed the "nominal mix." How to transform the "nominal mix" into the "field mix," in which the aggregates are measured damp and loose as found on the job, is illustrated in the following example.

Determining the Proportions for 3000 Lb. per Square Inch Concrete

Suppose the sand on the job is graded from 0 to 4 mesh, and the coarse aggregate is pebbles graded from 4 mesh to 1½ in. With these aggregates it is desired to make 3000 lb. per square inch concrete, that is, concrete that will develop that compressive strength at 28 days. The concrete is to be used where a comparatively dry mix may be handled. Concrete with a slump of 3 to 4 in. may be placed without difficulty on most jobs and this slump will be assumed.

The slump is measured by filling a truncated metal cone form with concrete as it leaves the mixer and noting the settlement from the original height when the cone is removed by raising it vertically. The metal cone is 8 in. in diameter at the bottom, 4 in. in diameter at the top, and 12 in. high. In filling the cone, the concrete is rodded into it in three approximately equal layers by rodding each layer 20 to 30 times with a ½-in. bullet pointed rod. Fig. 1 shows how the slump is measured.

Assume the proportions for 3000 lb. of concrete with fine aggregate graded from 0 to 4 mesh, coarse aggregate graded from 4 mesh to 1½ in., and a slump of 3 to 4 in., are 1:1.4:2.9. This is the "nominal mix," in which the aggregates are measured in a dry, rodded condition. Simple field tests must be made to determine how much fine and coarse aggregate measured damp and loose are required to make a given volume of each in a dry, rodded condition. A cylindrical metal measure, and tamping rod previously described, a scale or balance, and pans in which to dry the aggregates, are all the equipment necessary.

First, determine the weight of dry sand in a cubic foot of damp, loose sand as used on the job. To do this, fill the measure with a representative sample of sand from the pile in a damp, loose condition, striking off any excess. No tamping is done. Then thoroughly dry the contents of the measure and weight. Next, determine the weight of 1 cu. ft. of dry, rodded sand. Suppose the field tests gave the following results:

81.4 lb. = wt. of dry sand in 1 cu. ft. of sand measured damp and loose.

*A copy of this bulletin will be supplied free of charge by the Portland Cement Association, 111 West Washington street, Chicago, Ill.

115.0 lb. = wt. of 1 cu. ft. of dry, rodded sand.

Under such conditions it will require $\frac{115.0}{81.4}$ or 1.41 cu. ft. of damp, loose sand, as measured at the mixer, to make 1 cu. ft. of dry, rodded sand.

While coarse aggregate does not increase in volume because of the presence of moisture, there is an appreciable difference between rodded and loose measurement. The amount of damp, loose pebbles needed to make 1 cu. ft. of dry, rodded pebbles may be determined the same way as for sand. Suppose the field tests gave the following weights:

93.0 lb. = wt. of 1 cu. ft. of damp, loose pebbles.
106.0 lb. = wt. of 1 cu. ft. of dry, rodded pebbles.

Accordingly $\frac{106.0}{93.0}$ or 1.14 cu. ft. of damp, loose pebbles are needed to make 1 cu. ft. of dry, rodded pebbles.

The "nominal mix" assumed, 1:1.4:2.9, is transformed into the "field mix" by multiplying the dry, rodded volumes by the factors determined above, 1.41 for sand and 1.14 for pebbles, thus, 1:1.4x1.41:2.9x 1.14 or 1:1.97:3.31. When cement, sand, and pebbles are proportioned by volume at the mixer, a 1:1.97:3.31 "field mix," using only sufficient water to give a slump of 3 to 4 in., may be expected to give 3000 lb. per square inch concrete at 28 days, where the aggregates are graded as specified in this example and contain the same amount of moisture. Other aggregates with different gradings and moisture contents will require different "field mixes," each of which can be determined as above.

Proportioning by Weight

Measurement of concrete materials by weight at once eliminates the bulking effect of moisture and loose measurement. If the materials are perfectly dry, measurement by weight would insure the same quantities of materials in each batch. The only error, therefore, results from the weight of moisture contained in the aggregate and weighed as being aggregate.

Sand is almost never dry on a job. Ordinarily the variation of moisture ranges from 2 to 8%, with an average of about 4% by weight of the sand. The moisture in coarse aggregate will average about 2%.

Determining the Proportions by Weight for 2500 Lb. per Square Inch Concrete

Suppose this time it is desired to obtain 2500 lb. per square inch concrete, using the same aggregates and slump as before. The "nominal mix" (from tables) for a fine aggregate graded from 0 to 4 mesh, a coarse aggregate graded from 4 mesh to 1½ in., and a 3 to 4-in. slump, is 1:1.8:3.5.

To transform the "nominal mix" (aggregates measured in a dry, rodded condition) to the "field mix" by weight, simple field tests, similar to those where proportions by volume are used, may be made. Suppose the following results were obtained from the field tests:

85.5 lb. = wt. of 1 cu. ft. of damp, loose sand.
81.4 lb. = wt. of dry sand in 1 cu. ft. of damp, loose sand.

4.1 lb. = wt. of water in above sand.
93.0 lb. = wt. of 1 cu. ft. of damp, loose pebbles.
91.2 lb. = wt. of dry pebbles in 1 cu. ft. of damp, loose pebbles.

1.8 lb. = wt. of water in above pebbles.
115.0 lb. = wt. of 1 cu. ft. dry, rodded sand.
106.0 lb. = wt. of 1 cu. ft. dry, rodded pebbles.

The "nominal mix" by volume, 1:1.8:3.5 is first transformed into the "nominal mix" by weight by multiplying each of the above unit volumes by their weight per cubic foot (aggregates dry rodded):

$1\times94:1.8\times115.0:3.5\times106.0=94:207:371$

Dividing by 94 to put the mix in the customary form we get: 1:2.20:3.95.

From the field tests the per cent of moisture in each aggregate is determined as follows:

$\frac{4.1}{81.4}\times100=5\%$ moisture in the sand.

$\frac{1.8}{91.2}\times100=2\%$ moisture in pebbles.

The "nominal mix" by weight may now be transformed into the "field mix" by weight by multiplying the weight of the sand and pebbles by 1.05 and 1.02, respectively, to compensate for the moisture present:

$1:2.20\times1.05:3.95\times1.02=1:2.31:4.03$

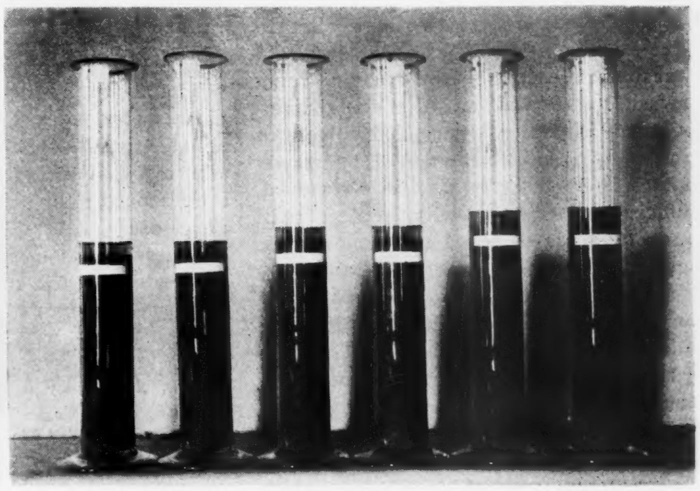
The preceding computations merely provide for the weights of sand and pebbles, when damp, that are necessary to give the required weights of dry sand and dry pebbles.

When cement, sand, and pebbles (the aggregates of the grading and moisture content specified in this example) are proportioned by weight, thus, 1:2.31:4.03, and just sufficient mixing water is used to give a 3 to 4-in. slump, the resulting concrete may be expected to develop a compressive strength of 2500 lb. per square inch at 28 days.

Inundation Method

When sand, regardless of its initial moisture content, is poured or shoveled into a measure containing sufficient water to flood or inundate it, the bulking due to its original moisture content is ironed out. That is, the amount of dry sand in a given volume of inundated sand is practically the same. This characteristic of sands has been recognized for several years and has been employed in developing an "inundator," or device for measuring the sand for a batch of concrete in an inundated condition. While used as yet only to a

Measuring the water ratio of a concrete mixture by the "slump" test



Volume of a given weight of dry sand in an inundated condition is about 6% greater than in a dry rodded condition

limited extent, the method appears to have much promise as it automatically corrects for the bulking of sand due to its moisture content.

Experimentation also points to the fact that there is a definite relation between the standard dry, rodded volume of a given weight of dry sand of a given size and grading, and the inundated volume of the same weight of this sand. This is indicated in the following experiment, the results of which are shown in Fig. 2.

The tall glass jars were originally filled to the top of the white paper strips with the same weight of dry, rodded sand. Coarse sand, graded from 0 to 4-mesh, was used in the first two jars (left to right), medium sand, graded from 0 to 8-mesh, in the middle two, and fine sand, graded from 0 to 48-mesh, in the remaining two. After the dry, rodded volume of each sample had been marked by means of the paper strip, the sand was removed. Sufficient water was then placed in each jar to inundate the sand and each sample scooped back into the jar it originally occupied. Fig. 2 shows that practically the same relation exists between the dry, rodded volume and the inundated volume of each grading of sand. Actual measurement shows that for the coarse sand the average inundated volume was about 6% greater than the dry, rodded volume, about 7% greater in case of the medium sand, and about 7½% greater in case of the fine sand. These results are in conformity with more extended tests which indicate that for sands evenly graded from 0 to 4-mesh, the inundated volume of a given weight of dry sand is about 6% greater than its dry, rodded volume. Where the inundation method of measuring sand is used in proportioning concrete for a specified strength, this relation should be determined for the sand on the job.

Determining the Proportions for 3500 Lb. per Square Inch Concrete

Suppose an inundator is to be used on a job where 3500 lb. per square inch concrete is required, using the same aggregates and slump as in the two preceding examples. From tables of dry, rodded materials, the nominal mix is found to be 1:1.0:2.4.

Field tests must now be made to determine how much sand in an inundated condition is necessary to make a cubic foot in a dry, rodded condition, and also how much loose, damp pebbles is required to make a cubic foot when dry and rodded. Suppose the tests gave the following results:

115.0 lb. = wt. of 1 cu. ft. of dry, rodded sand.
108.5 lb. = wt. of dry sand in 1 cu. ft. when inundated.

It will be apparent that, if the cubic foot of dry, rodded sand, whose weight was determined, is next inundated, it is not all required to fill the measure. If the remainder is weighed and subtracted from the original weight, the difference will be the weight of *dry* sand in a cubic foot when inundated.

From the above weights it is seen that $\frac{115.0}{108.5}$ or 1.06 cu. ft. of sand when inundated are required to make 1 cu. ft. in a dry, rodded condition. As the same pebble aggregate is to be used in this example as before, the result of the previous tests may be used here. These show that 1.14 cu. ft. of damp, loose pebbles are required to make 1 cu. ft. of dry, rodded pebbles. The "nominal mix," 1:10:2.4 may now be transformed into the "field mix" as follows:

$$1:1.0\times1.06:2.4\times1.14=1:1.06:2.74$$

The above proportions, using just sufficient water to give a 3 to 4-in. slump, should give 3500 lb. concrete at 28 days, where the above sand is measured in an inundator and the pebbles by volume damp and loose.

Where this method is used, in supplying the water for the mix, proper allowance must be made for the large quantity used in inundating the sand. The water used in inundation is part of the mixing water.

Conclusion

In the preceding paragraphs an attempt has been made to show how to make corrections in the proporitons for a concrete mix to produce a specified strength. Obviously, tables intending to give proportions for a specified strength must be based on constant conditions of measurement, and these proportions must then be corrected for field conditions in such a way as to obtain the basic quantities.

The tables from which the basic proportions used in the examples were taken are for good average conditions in which aggregates are well graded, and only thoroughly workable consistencies used. Whenever the aggregates are poorly graded or unusually harsh consistencies are used, test cylinders should be taken in order to check the proportions. In any case, however, it will always be necessary to make corrections for bulking, due to moisture and loose measurement.

A Mysterious Indiana Sand

FRED KELLAM, testing engineer for the Indiana highway commission recently showed one of the editors of ROCK PRODUCTS a sand which would meet every known specification for fine aggregate (except the strength test) and yet is unfit for use in concrete. Neither chemical nor physical analyses give any definite reason why this should be so. Under the glass the sand shows firm hard grains of quartz, limestone, bits of what appear to be quartzite and grains from other common rocks. There is practically no silt and the colorometric test shows no organic matter. From its appearance one would unhesitatingly pronounce it to be an excellent concrete sand.

Perhaps the most puzzling thing about this sand is that it gives the same strength in a mortar test, regardless of what the grading may be. Ordinary sands increase and decrease in mortar strength with the grading, as shown by the modulus of fineness, but this sand does not as is shown by the following summary of tests.

Fineness Modulus	Pct. of Strength of Standard Sand
2.78	89%
2.79	88%
2.81	85%
2.91	75%
2.93	84%
3.04	87%
3.17	90%
3.26	85%
3.38	88%

The grading of some of these samples was matched by a "synthetic" sand made by screening a good sand and recombining sizes in the same proportion as in the sand that was being studied. Tests on these synthetic sands gave results that might have been predicted from the modulus of fineness. So the grading of the sand does not influence the strength.

A chemical analysis showed the sand to contain the following:

Moisture	0.31%
Soluble matter	0.015%
Sulphates	Trace
Silica	52.10%
Iron and alumina	10.50%
Calcium oxide	11.28%
Magnesium oxide	6.90%
Loss on ignition (CO_2?)	16.69%

This analysis is not so different from one of the sands produced in Indianapolis which gives a very high strength test:

Silica	47.10%
Lime (CaO)	19.70%
Magnesium (MgO)	5.80%
Iron and alumina	7.90%
Soda (not water sol)	0.69%
Potash (not water sol.)	0.76%
Carbon dioxide	17.20%

Mr. Kellam's theory is that small quantities of an undetermined constituent may have an effect on the hydration of the cement. One would be interested to know of what the 0.015% of soluble matter consists and also the effect of the "trace" of sulphates found to be present.

At one of the meetings of Committee C9 of the American Society for Testing Materials it was proposed to do away with the strength test for sand as being of little practical value. Mr. Kellam who is a member of the committee cited this sand as an example of the necessity for a strength test.

The sand was not identified but Mr. Kellam said that it did not come from that part of the state in which the sand was of glacial origin. Another sand from a locality not so far removed from that which produced the sand which is being studied has shown something of the same characteristics.

On the Constitution and Burning of Artificial Portland Cement*

Part VIII. A Second Study of the Hydraulic Cementing Material Other Than the Artificial Cement—Causes of Defection of Mortars†

By J. E. Duchez
Authorized Translation from the French Revue des Materiaux de Construction by C. S. Darling

THE causes of disintegration of mortars are attributed to the presence in the hydraulic cementing materials of lime or magnesia not combined or not hydrated, or to the presence in the cements or mortars, or, in the surroundings, of sulphate of lime or soluble magnesia acting in the presence of water.

The manner in which these disintegrating agents act is complex. However, we can be assured that the phenomena of disintegration are produced principally under the influence of water by the dissolving or dehydrating action which modifies the internal crystallization. This disintegration is shown by cracks or swelling which characterize the development of enormous forces within the blocks of masonry, and independently, at the same time, there is a loss of cohesion in the mortar resulting from the slow or rapid modification of the initial crystallization, whether by the formation of new compounds or by simple change, meaning the disassociation into the constituent elements of the cementing material or the mortar.

The rapid or slow destruction under the action of water results, as M. Le Chatelier has indicated, from the greater or less solubility of all the active materials of the cement or the cementing material and from the variable solubility of the solid bodies according to the pressure which they support. This action is manifested by the destruction of certain hydrates under the influence of heat, by the hydration of certain bases, the slaking of which causes expansion, by the decomposition of calcium salts because of the dissolving of the limes entering into their composition, and finally by the decomposition of these same salts in the presence of magnesium salts.

1. Expansion from Incomplete Hydration

The expansive action due to the delayed hydration of the lime or the magnesia is certainly the most frequent cause of destruction. It is rare that the effects are very rapid, for the products where the faults of slaking are too marked would be quickly recognized and rejected. The consequences are generally quite serious; for when the first signs of expansion begin to show, the blocks of defective mortar already put in place are more often than not very important.

The materials subject to slaking in the hydraulic cementing materials are lime and magnesia or their extra-basic compounds with the acids, especially with alumina.

Pure lime hydrates rapidly on contact with water. It is not the same with magnesia which is exceptionally slow in hydrating, and its slowness of hydrating increases with the amount of burning. It is for this reason that magnesia is more dangerous in cement than in hydraulic limes, which are less argillacious and the burning of which has not been carried so far as the burning of cement.

We have explained in a previous study on the slaking of lime,‡ the manner in which hydration is produced and the mechanism of the penetration of water according to the compactness of the lime and extent of the surfaces in contact with water. This is not the place to return to the subject, and we will recall only that the compactness is as much greater as the lime is more burned and is, during burning, in the presence of a flux which has served to dissolve it and permit it to crystallize; and finally that the surfaces of contact are as much greater as the pieces are smaller and the burned product more porous.

In the case of cements or extra heavy limes, the question is further complicated by the reactions of lime and magnesia which crystallize together in an intimate isomorphic mixture, or are chemically combined with one and another or with the acids of the cementing material by the substitution of one for the other, equivalent for equivalent.

These lime magnesia compounds always have the effect of considerably retarding the action of water, the slaking becomes long and difficult and the set is very slow. There remains, therefore, almost always some lime and some magnesia not slaked which eventually causes swelling. The effects are more to be feared in the presence of moist air which penetrates slowly than in the presence of water which sometimes assures the rapid slaking of the lime before the end of the set, or before the relative solidification of the mortar.

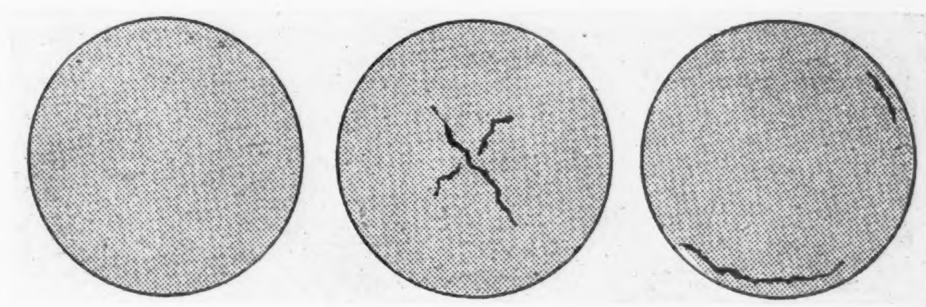


Fig. 1 *Fig. 2* *Fig. 3*

In this last case there is a modification of the strength as a result of the swelling which modifies the adhesion of the normal crystalline structure, but the use of the cementing material may still be possible although always uncertain, if the lack of fineness of the cementing material leaves large grains which are difficult to hydrate.

Figs. 1 to 13 show different phenomena noted on briquettes of cement or hydraulic lime eight centimeters (about 3 in.) diameter and 5 millimeters (about 0.2 in.) thick.

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†The *Revue des Materiaux de Construction*, August, September and October, 1923.

‡R. M. C. No. 163, 164, 165: The Rapid Slaking of Lime.

Fig. 1—Diagram of a briquette of hydraulic lime of good quality.

Fig. 2—Briquette of the same lime showing contraction cracks due to too rapid drying as a consequence of being exposed to the sun.

The same central cracks are found when mixtures which are too soft are used in the manufacture of the briquettes.

These cracks in the case of briquettes kept in the air, are not a strong indication of poor quality in the lime. They ought not to

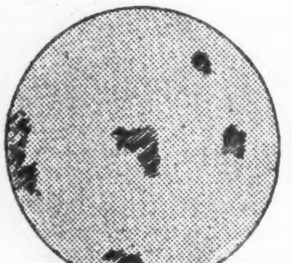


Fig. 4

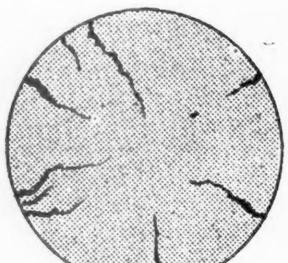


Fig. 5

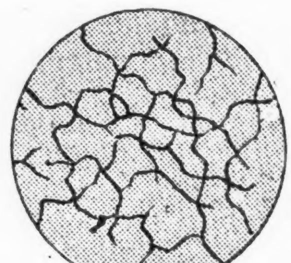


Fig. 6

occur when the briquette is kept under water, but in that event they would surely indicate expansion.

Fig. 3—In the majority of cases these cracks indicate an expansion of the briquette as a consequence of an unfavorable exposure. They are produced because of a bending of the edges, but they ought not to be produced in water or in moist air at temperatures below 20 deg. C. A weak expansion sometimes produces the same phenomenon.

Fig. 4—The briquette has blisters in various places without any crack. These blisters are caused by the presence of foreign matter in the cementing material or by a lack of sufficient burning.

This is not necessarily an indication of

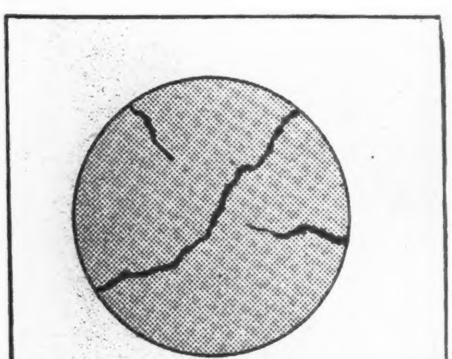


Fig. 7

bad quality of the cementing material, but it makes necessary a careful search to determine the exact causes.

Fig. 5—These radial cracks clearly indicate expansion. They are rarely produced in other cases, and they increase finally and indicate the complete disintegration as shown in Fig. 6 immediately below.

Figs. 6, 7, 8—These figures show the expansion cracks on two cements, one of which, shown in Fig. 8, adheres perfectly to glass and has caused the breaking of the plate.

Figs. 9 and 10—Cross section of the briquette 7 and 8 before the appearance of the cracks.

Fig. 11—Cross section of a briquette of good hydraulic lime without adhesion to glass.

Fig. 12—Cross section of a briquette of the same hydraulic lime exposed to the sun.

Fig. 13—Briquette of the same hydraulic lime plus 5% of poorly slaked lime kept for 48 hours in fresh water. The swelling is very distinct without any cracks.

These plans give a practical means of controlling the slaking, but it remains evident that the use of the Le Chatelier needles give these same indications in more precise manner.

2. Expansion by the Formation of New Compounds. Sulpho-aluminate of Lime

As we know, the action of sulphate of lime on hydraulic binding materials plays an important role in the decomposition of mortars placed in the ocean.

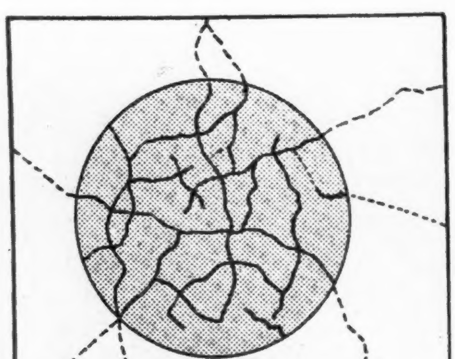


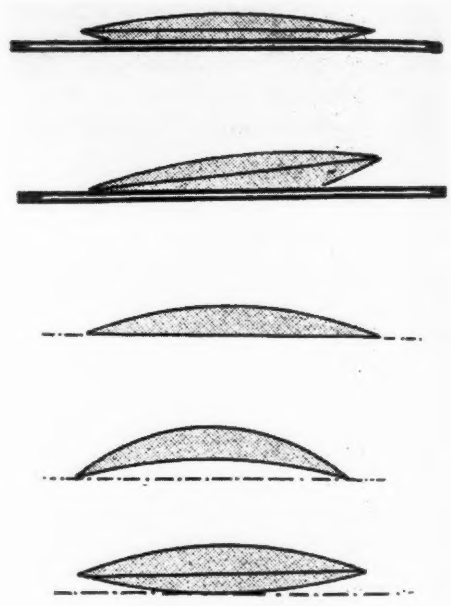
Fig. 8

M. Candlot has published in his book, "Cements and Hydraulic Limes," a study on the influence of the addition of sulphates of lime to cement. He indicates that these additions cause a retarding of the fresh cement, variable according to the quantities of sulphate added.

M. Candlot explains this phenomenon by the fact that "the aluminate of lime is insoluble in a saturated solution of lime and that consequently if we place in contact in water the aluminate of lime, sulphate of lime and free lime, the combination of the sulphate of lime with the aluminate will be very much retarded because the aluminate cannot hydrate as a consequence of the immediate dissolving of the lime."

This opinion is correct when the aluminate of the cement is tri-basic because the aluminate is saturated, so far as the lime is concerned, and cannot absorb more of it. But if the aluminate of the cement does not have three basic molecules, the set is rapid with or without the presence of free lime along with the sulphate of lime.

In the first part of this study on the con-



Figs. 9 (top) to 13

stitution of artificial portland cement, we indicated that the aluminate less basic than 3CaO hydrated by giving a quantity of hydrated tri-basic aluminate corresponding to the total quantity of the lime of the aluminate and liberating the hydrate of alumina capable of reacting with the free hydrated lime in the cementing material or added to the cementing material.

If the quantity of free lime, or that liberated in the cementing material is insufficient to saturate the free hydrated alumina to three molecules of lime, it is admissible that this hydrated alumina seeks elsewhere the lime which is lacking and absorbs for example that of the plaster added.

If this fact is correct, the retarding of the set becomes impossible and there is necessarily a rapid set of the cementing material, according to the following equation:

$$aq+Al_2O_33H_2O+3(SO_3CaO)$$
$$=Al_2O_33CaOaq+SO_3aq$$

without taking account for the moment of the possible reactions between SO_3aq and $Al_2O_33CaOaq$.

With the object of verifying a similar equation, we have added to a fused cement of the formula 0.44 $(SiO_2 2CaO) + Al_2O_3CaO$ different quantities of plaster, and we have obtained the following results:

Mixture	Beginning of Set	End of Set
Fused Cement Alone	47 min.	3 hr. 40 min.
Fused Cement 100 + 5% plaster	17 min.	55 min.
Fused Cement 100 + 15% plaster	12 min.	39 min.
Fused Cement 100 + 30% plaster	7 min.	28 min.

These experiments prove that the hydrated alumina takes up the lime of the plaster to form $Al_2O_3 3CaOaq$ and that the addition of plaster to a cement does not necessarily lead to a retarding of the set. There may be an acceleration.

However, in the fused cement considered, there is no free lime. This experiment, therefore, does not prove that the dissolving of the free lime prevents that of the sulphate of lime or the compounds of alumina with the sulphate of lime.

We have, therefore, been led to make the following experiments:

1. To vertify whether or not the set of the aluminate remains the same in the presence of $Ca(HO)_2$ or in the presence of SO_3CaO2H_2O.

(To be continued)

New Cement Company in Chile

(Assistant Trade Commissioner C. A. Brooks, Santiago, January 29, 1925)

THE Compania de Cemento de Polpaico has been organized by a group of Chilian capitalists, assisted by the firm of Gildemeister & Co., to develop the limestone deposits at Polpaico Station, some 60 kilometers from Santiago on the rail line connecting the capital with the port of Valparaiso.

The new company is tentatively capitalized at £250,000 sterling, which at a later date may be increased to £300,000 sterling. Gildemeister & Co. have subscribed £40,000 of the capital required and contemplate making a further investment.

The Cia de Cemento Polpaico will employ the "wet process" of manufacture using the calcareous stone and clay found on their property. Engineers who surveyed and analyzed the raw materials supply announced that there is enough in sight to manufacture a minimum of 50,000,000 bbl. of portland cement.

Three equipment companies, including an American firm, submitted plans and bids on the machinery and auxiliary installations. The Polysius Co. of Germany, whose prices were the lowest, will be awarded the contract amounting to about £126,000 sterling. This figure includes the cost of machinery and buildings. The plant will have a daily output of 1000 bbl. It is understood that the successful bidders will accept a part of their payments in shares of the cement company.

With the new plant producing 300,000 bbl. of cement annually plus the production of the Mellon Company, which in 1923 turned out 431,000 bbl., Chile will be practically able to meet her cement requirements with a home-made product. While the new output of the Palcaico Company will seriously affect the importation of cement, their bag and container requirements will stimulate trade in these commodities.

The provisional directorate of the Cia. de Cemento de Polcaico is composed of Alberto Bascunan Montes, president; Augusto Thiermann, vice president; Carlos Barrolhet, Carlos Balmaceda S., Julio Pereira I., Camilo Donoso D., Walter Piza, directors.

Gildemeister & Co. of Santiago have been acting as managers of the new enterprise.—Minerals Division, Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce.

Prices of Belgian Cement

ACCORDING to the invoices certified at the Brussels consulate during January the average price on cement shipped to the United States was $7.62 per ton, f.o.b. Antwerp, while individual prices ranged between $6.66 and $8.46 per ton. According to the invoice records of the Ghent consulate, the average price on cement shipped to the United States during January was $12.38 per ton, c. i. f., Atlantic port. The original invoices on file at the Consulate General indicate that shipments of cement during January were made at $0.54 per bag, c. i. f. Los Angeles and at $0.57½ per bag, f. o. b. Antwerp. A number of large shipments were made to California at the quotation of $2.15 per 4 bags, c. i. f., which is approximately $12.55 per ton.

Production figures of cement in Belgium are not available, but it is apparent however, from the increased exports to the United States that there was undoubtedly an increase in the domestic production of this commodity. The United States and particularly the Pacific States, offer an important market for Belgian cement, but the volume of exports to American ports can only be taken as a slight indication of the total production in Belgium. There is always a large demand for cement to be consumed domestically as the reconstruction of the industrial organizations continue to progress on a large scale. The housing crisis in Belgium also necessitates active efforts in order to increase the number of dwellings, and it is apparent, therefore, that a great deal of Belgian cement is consumed within the country.—Guy C. Riddell, chief, Minerals Division, Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce.

Roughly there are 6 bbl. to a ton (American measure), so that the lowest f.o.b. plant price in the United States is approximately $12 per ton, or about the same as the Belgian price plus freight charges to an Atlantic port.

Belgian Cement Importer Talks Reprisals if His Product Is Not Used

A PROTEST against the State Highway Commission adopting a policy as proposed by the Los Angeles Chamber of Commerce in a letter recently regarding the more general use of California-made cement on public highways, in preference to foreign cement, was made recently to representatives of the road body by Lewis Switzer of San Francisco, representative of Belgian and other foreign cement interests.

Mr. Switzer conferred with R. M. Morton and W. F. Noxon, chief engineer and secretary, respectively of the highway commission. The point made by him is that the adoption of any policy aimed against the use of foreign cement is apt to bring about retaliatory measures in European countries now exporting large quantities of cement to the United States, to the detriment of California's commerce with the foreign countries affected in agricultural products.

Switzer, who is an agent of the American Finance and Commerce Co., predicted that the Sacramento Valley particularly was in danger of being hard hit if the highway commission carries on the suggestion of the Los Angeles Chamber of Commerce.

Dunstable Portland Cement Company Financed by British Government

THE prospectus of the Dunstable Portland Cement Co., Ltd., shows that the share capital is to be £300,000, divided into 7½% cumulative preference shares of £1, and ordinary shares of the same denomination. A loan of £100,000 at 5% per annum for 10 years is being guaranteed by H.M. Government, on the security of a first mortgage debenture. The prospectus says: "The works to be erected will be up to date in every requisite detail, and will embody the most modern improvements, and economical methods of production. They will consist of two rotary kilns, with necessary subsidiary plants, each having an output capacity of about 1100 tons per week, or about 110,000 tons per annum for the two. Owing to the exceptional facilities the manufacturing cost will compare favorably with that of most other cement works in the country.—*Contract (Journal London).*

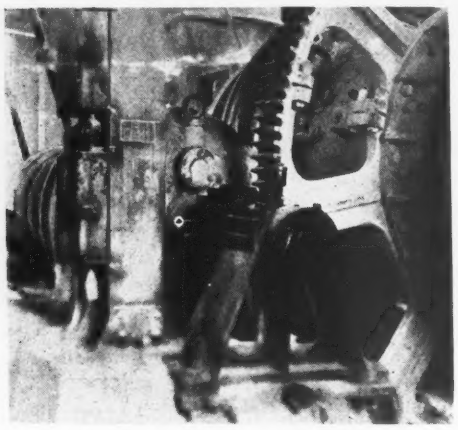
Wisconsin State Cement Plant Bill Killed

THE resolution by Assemblyman Frank Weber, Milwaukee, Wis., for an investigation of the feasibility of establishing a state owned cement plant, was killed in the senate by a vote of 20 to 10. A similar resolution was defeated at the last session of the legislature.—*Milwaukee (Wis.) Sentinel.*

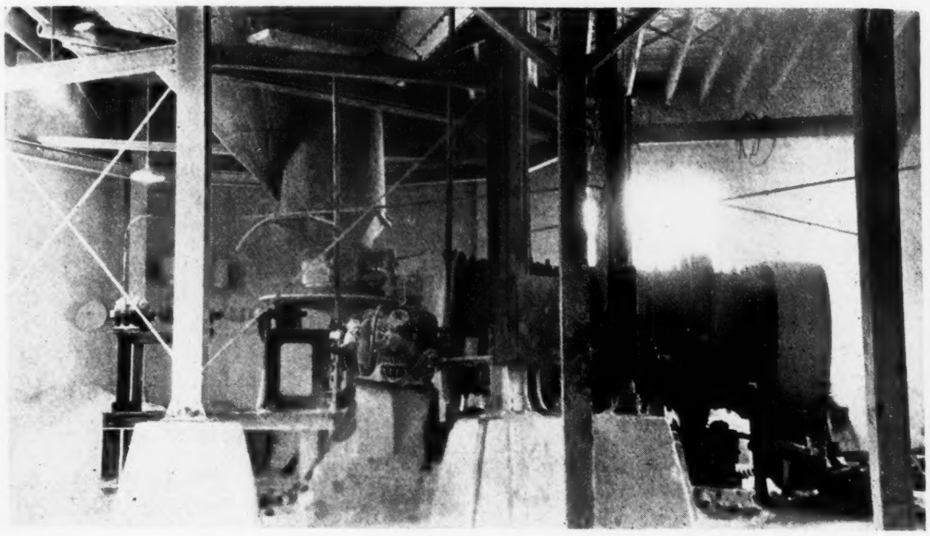
Hints and Helps for Superintendents

Direct Drive for Rod Mill

THE use of the rod mill for mixing and grinding of sand and lime for sand-lime brick manufacture is a comparitively new development in the industry. A good many plants are now using it with a great deal of success. But there had never yet been a direct connected drive until the Sand-Lime Products Co., Detroit, Mich., installed their rod mill. In this case space was very limited and in order to take advantage of every inch of space, the rod mill was direct connected to 50-h.p., 1160 r.p.m. motor, through a Jones double gear reducer. The reducer has a ratio of 9 1/10 to 1, bringing the speed of the rod mill down to 127½ r.p.m. The mill is charged with 4 tons of rods ranging from 3 to 5-in. in diameter by 10 ft. long. The mill, motor and gear reducers weigh 34 tons. The application of the drive is shown in the accompanying photographs.



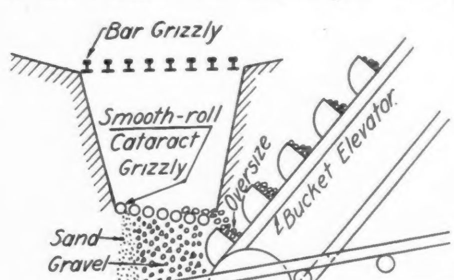
Direct-motor drive for rod mill is unusual



A general view of rod mill with direct motor drive

Special Use for Roller Grizzly

AT the St. Paul, Minn., sand and gravel plant of the J. L. Shiely Co., a Robins "cataract" grizzly is used for both a separator and a feeder. The oversize goes off the end to a bucket elevator to be crushed, and the commercially sized gravel drops through to a belt conveyor and goes to the sizing screens and washers.



Device for taking out fines on first roller of a "Cataract" grizzly

As most operators probably know the "cataract" grizzly is a series of slotted rolls which ride the oversize and "shoot" the undersize through in short order. At this plant the slotted roll at the head of the grizzly was replaced with a smooth-faced roll, which allows the sand to drop through immediately, but passes practically all the gravel. The sand dropping on the belt cushions the belt for the gravel which follows and thus preserves the belt from excessive abrasion.

Babbitts and Babbitting

By W. F. SCHAPHORST, M.E.
Newark, N. J.

IN view of the fact that from 20 to 30% of the power given up by engines and motors is generally absorbed by bearings in the form of friction, it is very important that the bearing be properly babbitted.

Each bearing, whether ball bearing, roller bearing, or plain, absorbs a certain amount of power. Multiply that power by the number of bearings throughout the plant and the total loss will probably astound you.

If they are plain bearings, do a good job of babbitting, then oil the bearings properly, and the difference in drag of each bearing will be immediately noticeable and probably measurable. Multiply that difference by the number of bearings in the entire plant and you have the total saving in power. The saving in wear due to proper babbitting is often just as important as the saving of power. Furthermore, the less the friction the less the oil consumption—another saving and often a very important one.

Of course, no surfaces are perfectly smooth. They may feel smooth to one's finger tips but nevertheless under a magnifying glass the surfaces will be found to be decidedly rough with multitudinous small hills and valleys all over. The good babbitt metal is that metal which will produce a very smooth mirror-like surface on which the hills and valleys will be reduced to the very minimum.

Lead Has Virtues

Contrary to most beliefs, lead would make a very good anti-friction material if it weren't so soft. Its coefficient of friction is very low and it can be plastered down so that the hills and valleys are almost invisible even under the most powerful microscope. To make the lead harder so that it will hold up the load antimony is usually added. And then copper and tin are added to create both toughness and hardness. In addition, tin acts as a solder in uniting all of the metals.

The purchaser of high-grade machinery should see to it that no bearing in any machine is subjected to a load greater than 2500 lb. per sq. in. That, remember, is the very maximum. For ordinary operation keep the load below 1500 lb. per sq. in. and you can be pretty sure of long service provided the correct babbitt metal is used and provided the bearings are properly lubricated.

There is a babbitt commonly used known as "genuine babbitt" which is very strong and tough, being made up of 80-90% of tin. But in modern bearings we seldom have anything but compressive stresses within the babbitt so why should the babbitt contain

so much tin? It may therefore be generally regarded as good practice to reduce the percentage of tin as much as possible. Bearing metals cost considerably less and naturally give better service if they contain a larger percentage of lead and just the right amount of tin. They will stand higher speeds and absorb less power. In a great many actual instances genuine babbitt bearings have given trouble and have been replaced by lead base babbitt and no more trouble has been experienced.

As for price, however, never buy a bearing metal on a cost basis. First think of the bearing—of the transmission problem and then pick out the metal that best cares for the problem.

Common Ingredients

The following metals are the ones that are the most used in making babbitts: Lead, tin, antimony, copper and bismuth.

The principal trouble with lead is that it melts at a trifle over 600 deg. Fahr. and as already stated it is very soft. However, it has a lower coefficient of friction than any other metal, being in that respect similar to graphite.

To make the bearing metal tougher, stronger and more dense, add tin. Tin, however, lowers the melting point and increases the friction. Tin melts at a temperature close to 450 deg. Fahr.

Unlike tin, antimony raises the melting point. It makes the bearing metal still harder. Unlike tin, it also reduces friction. By reducing friction the tendency to heat is also reduced. Antimony melts at a little less than 1200 deg. Fahr. It tends to make the metal brittle. All in all antimony is a "pretty good metal" for bearings.

Copper increases the melting point and makes the metal tougher and harder but at the same time, surprising as it may seem, it increases the friction. Its melting point is the highest of them all, being over 1900 deg. Fahr. Copper should be used very sparingly in bearings, and it generally is.

Bismuth Prevents Shrinkage

To prevent shrinkage of the bearing metal, add bismuth. Bismuth also reduces friction. It melts at a temperature of slightly over 500 deg. Fahr. One of the objections to bismuth, though, is its cost, being over $2 per lb.

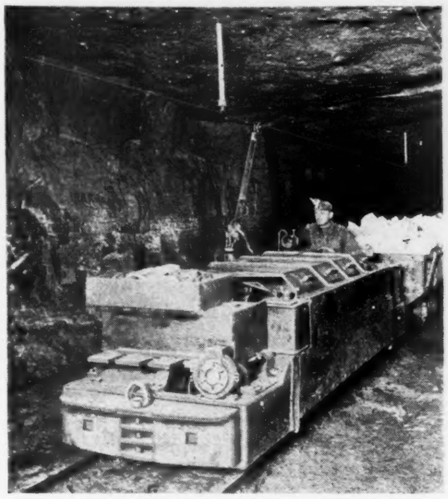
Occasionally aluminum is mixed in bearing metals. It melts at 1160 deg. Fahr., adds toughness and serves as a flux and at the same time increases friction. One therefore cannot recommend a very liberal usage of aluminum or copper.

One peculiarity noticeable in the mixing of metals is that after being once melted and mixed the melting point of the mixture decreases. That is, the melting point of the bearing metal will melt at a lower temperature than the melting point of the highest of the original metals. Sometimes the melting point of the mixed bearing metal drops below that of the melting point of the original whose melting point was the lowest.

Getting Good Contact for Mine Locomotive Wheels

At the Fort Dodge, Iowa, plant of the Beaver Products Co., Inc., American Cement Plaster Division, the "room and pillar" method of mining is in use. Sufficient rooms and entries have been opened up so that a production of from 800 to 1,000 tons per day can be maintained.

A 6-ton Goodman, single motor electric locomotive gets the cars on the main haulageway and delivers to the foot of the shaft where the cars are hoisted to the crushing plant.



Getting good contact on mine rails under damp conditions

This particular mine is fortunate because of the absence of excessive water, but this very absence caused trouble in another way. The fine gypsum gummed the rails and prevented good contact of the locomotive wheels for current return. This caused arcing and rapid wear of tires.

The difficulty was removed by mounting on the front cab of the locomotive a tank from which water is led by small tubing, through a pet cock, to each rail. Thus the rails are wetted, softening the gypsum and giving good electrical contact.

A Lighthouse for Dredging Operations

Dredging is carried on at night at the Penn plant of the Charles Warner Co. near Tullytown, Penn. To assist in the work headlights are used wherever needed.

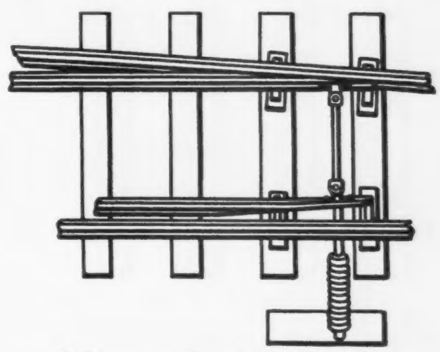
One of these is mounted on the little tower shown in such a way as to throw its beams along the barge which is being unloaded. It can also be swung so that it can serve the purpose of a lighthouse to the dredge and tow boat, that is it can serve as a shore mark by which the position of the dock may be determined on a dark night. The lamp is of a type that can be bought in many places and it is furnished with a lens and reflector to concentrate the rays.

A lighthouse for dredging sand and gravel operations

The dimness in the picture comes from a puff of steam from a tugboat that blew across the lamp just as the picture was taken.

Homemade Automatic Track Switch

The J. L. Shiely Co., in their new sand and gravel plant in St. Paul, Minn., use a very simple and effective automatic switch in connection with their railway track system. Loaded cars come in on one track, pass through the switch and the empties go out through that same switch on another track. This switch will work only under these conditions, that is, where there are two separate systems of track for the empty and loaded cars. The accompanying sketch shows the switch. As the loaded car is passing through it the spring is in tension at this moment, and as soon as the car passes the switch, tension is released and it springs back to the open position for the empty cars. If it is desired to change the switch, that is from one side to the other, it is only necessary to transfer the spring to the other side. It works very effectively and may be easily installed.



A home-made automatic switch

Universal Ignorance of Shaft Kiln Operation

Probably Less Real Information Available Than on Any Other Device Used in Modern Industry

THE approaching annual convention of the National Lime Association, May 26 to 29, at Briarcliffe Lodge, Westchester County, N. Y., offers an opportunity to start finding out a little something about the operation of shaft kilns. A good beginning is to be made by a paper by Victor J. Azbe, consulting combustion engineer, St. Louis, Mo., who has undoubtedly made a more thorough study of lime-kiln operation as a combustion problem than any other technical expert to date. There is also to be a round-table discussion by all who are interested in the technical phases of lime manufacture and we hope there will be plently of plant superintendents and engineers there—and that kiln operation will be discussed.

Several engineers have attempted to solve some of the mysteries of shaft-kiln operation at various times, but the universal complaint seems to have been that they received scant encouragement from the lime industry. Today there are numerous engineers and technical men in the lime industry as owners and operators, and it would seem as though an auspicious time had arrived for again taking up these problems with a determination to arrive at some tangible results.

Coming! Big Convention of the Lime Industry

THE seventh annual convention of the National Lime Association and the twenty-third annual meeting of American lime manufacturers will be held May 26 to 29, inclusive, at Briarcliff Lodge, Westchester County, New York.

The meeting will follow the lines of the annual meeting last year at White Sulphur Springs, W. Va., with the mornings and some of the evenings devoted to reports of work accomplished during the past year, results of fellowships, as well as talks by well-known speakers on the subject of manufacturing problems. It is proposed to hold another Round Table Research Conference on one evening. The first of these conferences held last year was a decidedly interesting session.

Little Known Abroad

American lime manufacturers may derive some satisfaction in knowing that probably not much more progress has been made in the study of shaft lime kilns abroad than has been made here by such men as Mr. Azbe; but, on the other hand, American manufacturers in nearly all lines pride themselves on *leading* not *following* in scientific progress, so there exists a real opportunity for lime manufacturers as organized in the National Lime Association to start something.

What follows are excerpts from an article in our French contemporary *Revue des Materiaux de Construction* entitled "Notes on the Vertical Kiln" by A. S. Klein, engineer. It will prove interesting to compare Mr. Klein's observations with those of Mr. Azbe in ROCK PRODUCTS of March 21.

Mr. Klein prefaces his article by stating: "The vertical kiln, in spite of its ancient origin, has been little studied." His article relates wholly to internally fired kilns, but some of the comments he makes doubtless apply to all shaft kilns. Other characteristics of the kiln he describes are open grates at the bottom, eight feeding doors, a closed top and stack.

What follows in a rather free translation of some of Mr. Klein's comments:

Control of Operations

It has been correctly said that if in general the vertical kiln performs so badly it is because the attendants are not given sufficient means of knowing its condition at all times.

For that purpose various means have been proposed, the most common of which is to make observations at the level of the fire zone by openings (peep holes) through the refractory lining of the kiln.

We have never experimented with this system which seems immediately to present inconveniences, such for example as radiation, obstruction of view by dust, deterioration of the perforated refractory brick, and especially incomplete vision of what is happening within the kiln.

A more simple method and one which succeeds perfectly consists of plunging into the mass in the kiln iron bars, which can be quickly withdrawn by means of a windlass or tackle which is movably mounted on a rail surmounting the stack. There is thus obtained by the colors which the bar assumes a true cross-section of the various zones of temperature.

At the burning temperature of cement the bars melt and break, but by allowing them to remain only for a short time, which can be determined in advance as sufficient, five minutes, for example, and establishing a scale of corresponding temperatures, good results are obtained.

A more perfect scheme would be perhaps obtained by the installation of thermoelectric couples, at fixed or movable points, but that is a question to be determined. (This has been done in at least two American lime plants with considerable success.—Editor).

Combustion Problems

The temperature and chemical composition of the gases are very important to know, but the deductions from these facts require precautions.

The density of the external cold air is more than double that of the gases and besides there are almost always formed descending currents of cold air coincident with the ascending currents of gases, forming a mixture where special precautions are not taken. We have overcome this difficulty by a plate of sheet iron, which, sometime before the taking of the gas sample, is used to cover three-quarters of the top opening of the stack.

We still do not have the exact chemical composition, for we cannot avoid entirely the defect in the closing of the top or of the crevices of the masonry in the sides of the kiln.

If we wish an absolutely certain result, it is necessary to get the samples for our information at the middle of the mass by means of iron pipe, which can if necessary be sunk into the mass in the kiln by hammer blows.

Referring Especially to Internally-Fired Kilns

What follows is not of particular interest to American lime manufacturers at the present moment because they have largely gotten away from the practice of using internally-fired kilns. But, when the time comes for them to take an interest in the manufacture of *hydraulic limes*, the internally-fired kiln will undoubtedly play an important part. For the internally-fired kiln is an efficient kiln from the point of view of combustion

and fuel consumption, and in the case of hydraulic limes used for construction purposes only, contamination by ash is not necessarily a deteriment and may even be an advantage. To resume Mr. Klein's discussion:

Thickness of Layers

What thickness should the layers of limestone have?

The flame which rises from one layer of coal should easily reach the layer above while passing through the limestone. Now it is well known that the length of a flame is about ten times the average diameter of the pieces of coal; this, therefore, is the measure of the thickness of the layers of limestone.

Actually, the conditions of operating a shaft kiln are quite different from those of a boiler, nevertheless, the foregoing rule applies quite well.

We have noted that, if for any reason the fire is allowed to reach the surface without a charge of cold stone, blue flames of carbon monoxide several meters in length escape from the top of the kiln, but they do not escape everywhere; they come from a small number of mouths which function as so many flues.

In the mass of rock included in the fire zone, there are formed passageways of less resistance by which an intense circulation is established, and consequently the layers of stone do not want to be made so thick as to force the combustion gases into such passageways or flues, but to be thin enough to compel the flames to lap every piece of rock. The zone of resistance to the fire should be traversed at all points.

In practice French manufacturers now use coal in very small particles, even dust; the thickness of the layers of limestone should therefore be sufficiently small so that considering the irregularities of the surfaces there are properly speaking no layers, but a homogeneous mixture.

Dimensions of the Stone Fed to the Kiln

The larger the material, the larger are the voids, and the faster the fire rises and the easier it is to control; if the charging and withdrawing, manual or mechanical, is conveniently arranged there is no reason for requiring small stone for the good operation of the fire.

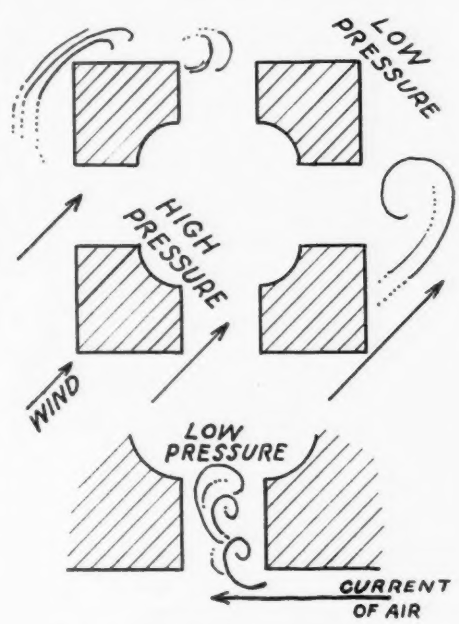
But up to what dimension of stone is it possible to go in order that the burning reaches the center of the rock? Evidently this depends on the calorific conductivity of the solid put in the furnace.

The conductivity of natural stone is in general very high, almost instantaneous; this can be determined by experiment with hydrochloric acid on unburned stone of different degrees. We have never found pieces of stone showing effervescence in the center and not at the edge, proving the decarbonation takes place everywhere at the same time. We have experimented with a more precise reagent, bichloride of mercury in a hot 10% solution, as demonstrated by Le Chatelier; on the carbonate of lime it has no effect; on a particle containing a small amount of free lime it gives the red oxide of mercury, and on a particle richer in free lime it gives the yellow oxide. Now outside of small zones very close to the surface and very thin (one millimeter) which have been cracked by the fire, we have never found a difference between the coloring of the particles near the surface and of those near the center.

This being true, large pieces of material are quite permissible; twenty to thirty centimeters (8 to 12 in.) in diameter are not too large. We have seen larger ones burn more easily perhaps than small ones.

Formation of the Fused Material

An examination of the fused material in its different degrees of density shows that the "beginning" of the incipient fusion is in general quite late. The stones no longer



Figs. 1 and 2 illustrating effect of wind on kiln draft

have any solidity, since they bend and flow one on another so as to leave no voids; they do not even need any pressure to fit in quite perfectly in this manner.

The ease of formation of the flux appears also to be connected with other phenomena than that alone of pressure. When the rock at some point reaches the fusion stage it carries with it the fusion to the neighboring zones. It exercises on them a sort of catalytic action.

Along the preferential ducts (draft openings between the stone) where an intense circulation and combustion occur, the temperature rises sufficiently to cause fusion and the beginning of the fluxing. Similarly, along the refractory lining of the kiln, causing sticking.

To avoid the fluxing, or at least to render it difficult, it is necessary to control the circulation of air, or draft, and divide this uniformly. This can be done only with very low furnaces, the reduction of height bringing them down to the zone of cooling.

At the same time, what is called the overburned part will disappear, that is to say, the reddish frits, which do not harden on being moistened. Where the same materials are burned in the rotary kiln at a higher temperature they give excellent cements and it is impossible to talk about overburned materials. Besides, there are often found rocks passing directly from the raw to the so-called overburned state without any intermediate stage. This overburned material consists of particles burned in a reducing atmosphere. They always occur at the center of large blocks, spots which certainly have lacked air. A very regular burning with an even sizing of the material permits the air to pass freely everywhere, and results in no overburned material.

Height of Kiln

The height between the fire zone and the ground should be such that the rock has time to cool in descending.

If the flux forms, the height is never enough; the flux remaining red at several centimeters from the surface during several days; if on the other hand, the pieces come out independently, a very small height will be sufficient; a piece 15 centimeters (about 6 in.) in diameter coming out red and placed on the ground is cooled in 20 minutes; with automatic-discharge kilns 10 meters (about 33 ft.) high the time for the clinker to cool is about 15 hours; it is apparent that there is considerable latitude. Theoretically a zone of cooling one meter high would be sufficient.

We have seen above that the difference between the zone of fire and the top of the kiln had no influence on the formation of the flux, but it should always be as small as possible, at least to the cooling cone. We know how bad it is to fire a kiln from the base.

To review, the non-formation of the flux would permit a perfect burning in a low kiln, and inversely, a low kiln would perhaps be a means of avoiding a flux, two conditions which are in harmony but which demand a careful consideration.

The vertical kiln which appears to us likely to survive is a kiln 3 to 4 meters high (10 to 13 ft.) between the cone and the draw openings.

Natural Draft

We are looking here for an explanation of the anomaly often noted at kilns always having the fire on one side, or, if you will, lacking draft on the opposite side.

In general, the part which has no fire is that which is most exposed to the inclemency of the weather, and radiation of the heat through the shell has been blamed.

A simple calculation proves that this explanation cannot be correct; radiation through a wall one meter thick is at the rate of about 1,500 calories per square meter

per hour, or about 200 grams (about ½ lb.) of coal, which is negligible. It is possible to increase the fuel on this side by that quantity, but experience proves that the situation is not helped by this method.

The cause must be sought in the dead currents of air in the passages formed at draw openings. All theories can be based on the direction of the wind with respect to these doors. Assume the case in Fig. 1 which explains itself; it is clear that on the side of the atmospheric pressure depressions a draft will be lacking.

Fig. 2 represents the case of a kiln standing against a hill, the depression is on the exposed side and radiation will be blamed.

To obviate this inconvenience, the kiln has often been surrounded by a wall extending to the top of the kiln. This is too much; a low room forming a reservoir of air is sufficient.

Descent of Materials

We will consider only the case where flux is not formed. All sorts of methods have been devised to permit the simultaneous drawing over the entire surface in lime kilns, but these have only a relative value. In fact, at a height of the draw gates equal to the diameter of the kiln, the charge descends as a whole; it does not choke in an inverted cone except near the opening.

Therefore, for a lime kiln, all drawing arrangements are good. For a kiln producing natural cement the presence of flux opposes the descent as a whole, and there is no longer any agreement between the part detached below and that which falls in above; nothing remains but to feel one's way, and it is in this case only it is useful to be able to draw at all points.

As before mentioned, the above refers to internally-fired kilns—where the fuel and stone are fed in alternate layers. Yet many of the points discussed in regard to draft and kiln conditions are probably also true of furnace-fired kilns. The furnace-fired kiln is merely an evolution of the internally-fired kiln, designed to keep the ash out of the lime. In the case of gas-fired kilns nearly all of the foregoing would seem to have some application.

Canadian Limestone Rate for Farmers Reduced

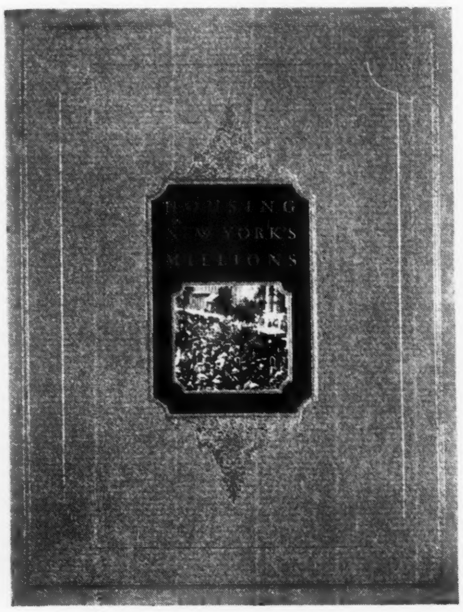
A SAVING to the farmers of the province of Ontario of at least $200,000 annually was announced as effected by concessions which the Agricultural Inquiry Committee has secured in the freight rates upon limestone for purposes of farm fertilizer, according to the Toronto (Ont.) *Mail and Empire*. A new schedule of rates was declared to have been agreed to at a conference of the Dominion Ry. Board and traffic managers of the C. N. R. and C. P. R. railroads.

The rates that will go in force in Ontario allow for a delivered price for ground limestone that is only a little over half the prices at which limestone could be secured heretofore. The reductions apply all the way down from a 500 to a 10-mile haul for carload lots.

The principal saving to the farmer in the matter is understood not to be in the matter of freight charges alone, but also in the matter of the increased productivity of his land. One of the members of the Legislature who has been experimenting with limestone as a fertilizer has found out that fields which are treated with it yield him $48 more per acre in revenue than do any others.

An Attractive Lime Publicity Booklet

THE illustration herewith hardly does justice to the attractive booklet recently issued by the Rockland and Rockport Lime



Booklet published by the Rockland and Rockport Lime Corporation

Corporation, Rockland, Me. It is a 9x12-in. book of 32 pp., handsomely bound and illustrated with half-tones of some of the notable apartment houses in New York City where Rockland Lime has been used for plaster.

Use of Limestone in Alkali Manufacture

INCLUDED in the raw materials used in the manufacture of alkali at the Mathieson Alkali Works at Saltville, Va., are coal, limestone and ammonia. Coal is available nearby from the extensive fields of southwestern Virginia, which provide a plentiful supply with a short freight haul. Limestone is obtained from a quarry owned and operated by the company. The stone is transported by an aerial tramway from the quarry to the works, a distance of approximately seven miles.

Caustic soda is made by treating a solution of soda ash, at boiling temperature, with lime. In the reaction, calcium carbonate is precipitated and allowed to settle. The clear caustic soda solution remaining is drawn off and evaporated until free of water, when the fused caustic is run into sheetiron drums, allowed to solidify and sealed ready for shipment.—*Manufacturers Record.*

Central European Magnesite Export Syndicate

Assistant Trade Commissioner Elbert Baldwin, Vienna

THE magnesite producers of Austria, Czechoslovakia and Hungary have formed an export sales syndicate centered upon the existing export organization of the Veitscher Magnesitwerke of Austria and similar to the syndicates previously formed by central European iron and steel plants. The syndidate began operations in February and will handle 85% of all export business on a quota basis, with the outstanding exception of sales to the United States. The remaining 15% represents independent transactions with minor markets, such as the Baltic countries and Spain. Shipments consist almost entirely of dead burned magnesite. It is intended mutually to lower export sales costs and eventually lower prices may result; otherwise, the development is not expected to affect the present export business.

The snydicate, which has been formed for an initial period of three years, includes the magnesite-producing industries in Austria, Czechoslovakia and Hungary—with the exception of the Herkuleswerke A. G. Kaschau, Czechoslovakia and the Alpine Montangesellschaft A. G. Leoben, Austria—as well as certain magnesite brick works in these countries, Germany and in England. Of the member companies three have headquarters in Austria, three in Czechoslovakia, two in Germany and one in England, and an agreement has been reached with Italian magnesite producers who have not officially joined the syndicate.

Austria the Largest Producer and Exporter

Although export sales to the United States are, by far, the most important, they will not be handled by the syndicate in view of existing agreements, but will continue in their present direct channels between producers and American importers. Of the three countries represented, Austria has both the largest production and export. Its shipments in the first nine months of 1924 totaled 53,000 metric tons, valued at approximately $1,000,000, in comparison with 70,000 tons during the corresponding period of 1923. Of the 1924 exports approximately 37,000 tons, or 70%, were shipped to the United States. Austrian dead burned magnesite at present commands an export price of $16 per ton f.o.b. plant, if for shipment to the United States, and as high as $20 per ton, if for shipment to European countries.

Innovations in Making Sand-Lime Brick

Labor-Saving Machinery and Automatic Material Handling Effect Saving

By Charles A. Breskin

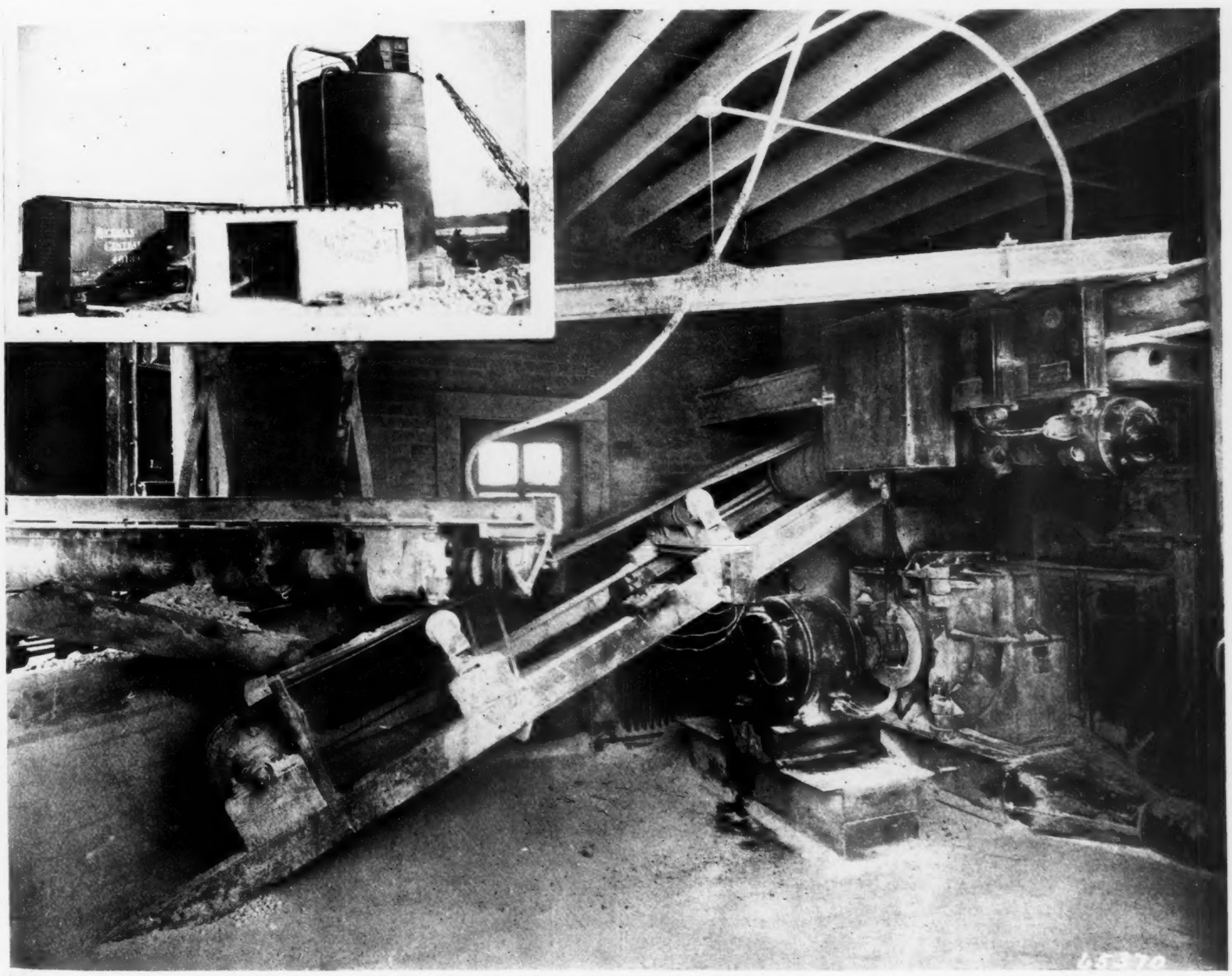
MATERIAL handling in the process of sand-lime brick manufacture is of vital importance. Great quantities of sand and lime have to be handled and the cost at this end largely determines upon what price the finished brick may be sold. With so important a consideration before them, and an ever increasing market for their product, sand-lime brick manufacturers have seen fit to install labor-saving machinery for material handling.

The Sand-Lime Products Co., Detroit, Mich., have recently installed a sand and lime handling system with many unusual features, chief of which is that the system has only to operate 1¼ hours per day to supply the entire needs of a 60,000 brick per day plant.

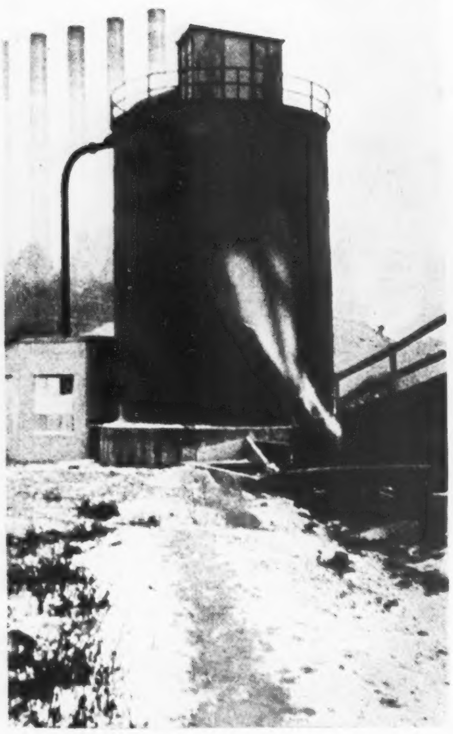
Sand-lime brick are made by mixing together about 94% silica sand with about 6% of lime. The lime must be hydrated before the mixture is pressed into brick, and there must be sufficient water or moisture in the mixture to make it plastic and sticky so that the green brick will hold together until they can be put into the hardening kettles or cylinders for steam treating.

The Sand-Lime Products Co., is one of the few sand-lime brick companies in the United States, to use lake or river sand. Their plant is located on the Detroit River within the city of Detroit. The sand is pumped from the bottom of Lake St. Clair and is delivered by boat to their plant.

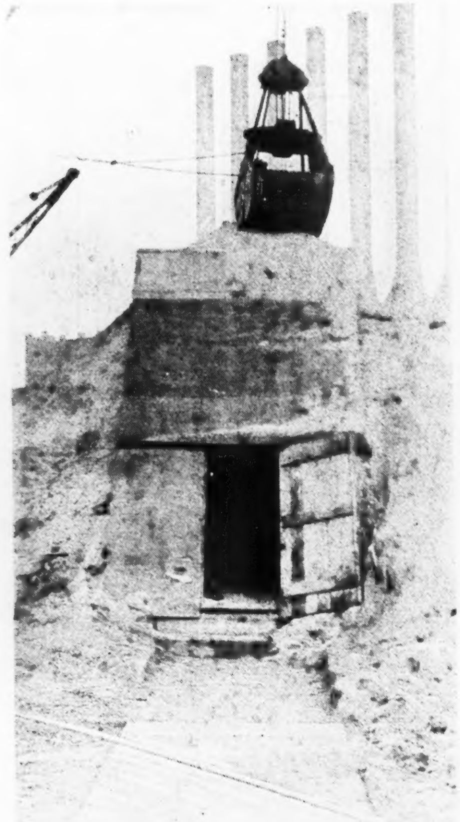
The fundamental principle of their operation consists of drying this sand by mixing it with the pulverized quick lime in proportion suitable for making brick. The quicklime absorbs the water and is itself hydrated



Insert: Lime unloading plant; below, inside of unloading house showing box car unloader suspended on trolleys from I-beam crane. The belt conveyor discharges to a pulverizer direct connected to a suction fan which delivers the pulverized lime to a steel tank



Sand storage with conveyor in tunnel



Belt conveyor coming out from under lime bin

in one operation. This sand was formerly dried by putting it through a sand dryer.

A Brown Hoist locomotive crane handles all sand required for the operation of the plant, piling it into stock for winter months and reclaiming it from storage during the winter months. Sand boats operate only eight months of the year, navigation being closed the remainder of the time. Sand is taken from storage by the crane and piled against the walls and upon the roof of a sand house, illustrated in one of the accompanying photographs. This building contains a large diameter screw feeder, direct driven by a motor through a Jones reduction gear set. The sand feeds through an opening in the wall of the sand house into the screw feeder by gravity. The latter delivers a definite measured quantity continuously to a belt conveyor running in a tunnel below.

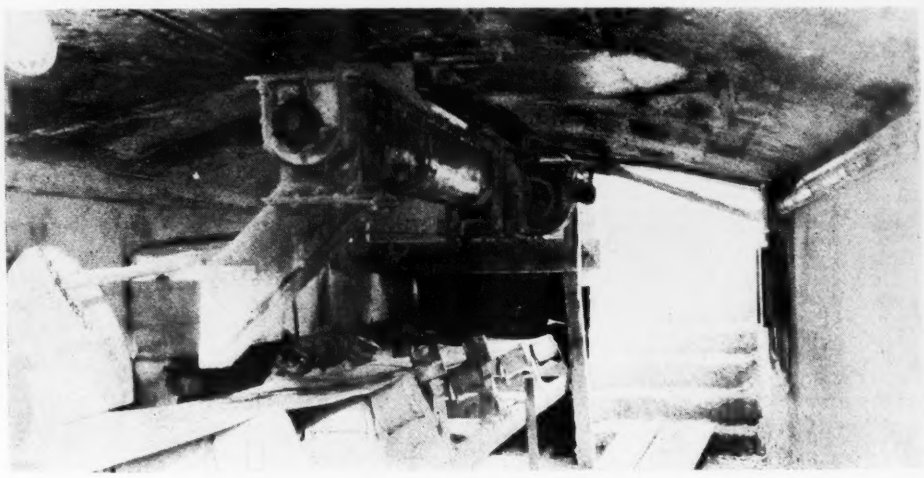
The belt conveyor is 400 ft. centers, and is used to convey not only the sand from the dock to the plant, but also the lime from the lime storage bin to the plant. While conveying from dock to plant the conveyor also serves the purpose of an elevator and raises the mix to an elevation sufficient to provide for automatic or gravity feed to equipment in the brick plant. This conveyor is equipped with ball-bearing troughing rollers made by Stephens-Adamson Co.

The tail pulley and all pulleys making up the gravity take up are slat pulleys equipped with Timken roller bearings completely enclosed within the pulley and running in oil. These are of the company's own design. The conveyor belt is 18-in., 5-ply, ⅛-in. rubber covered and was furnished by the United States Rubber Co. The conveyor handles in one and a quarter hours, all the raw materials necessary to make 60,000 brick per day, which is the ten-hour capacity of the plant. To handle all of these materials amounting to about 150 tons, there is a provided a 10-h.p. motor. The head pulley is driven direct through a Jones reduction gear set.

Pulverizing Plant

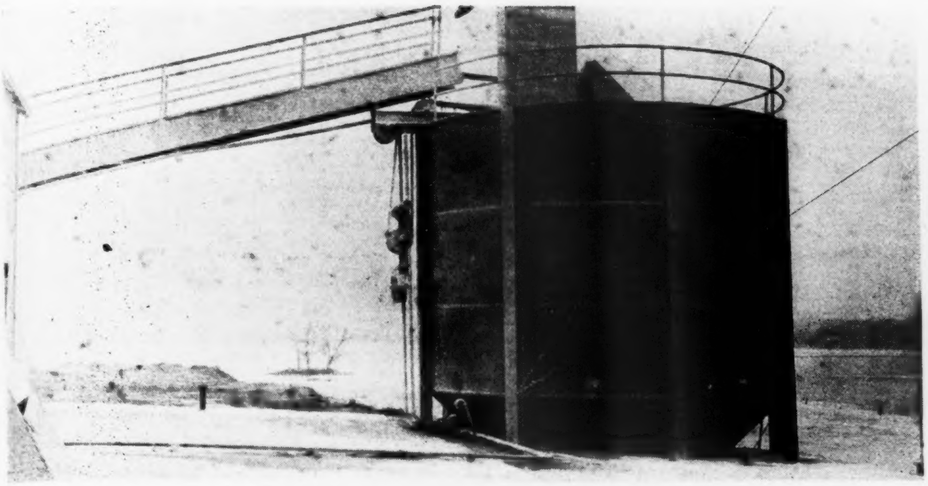
Quick lime is shipped to the plant in bulk, the box cars being unloaded at the pulverizing plant. A unique system is employed for unloading. Lime is shoveled by hand from the car into the hopper of a screw conveyor, which is suspended from an I-beam by trolleys and can be carried out into the box car for unloading or shoved out of the way when not in use. The screw conveyor has a tapering section at the feeding end, and the hopper is adjustable lengthwise, making it possible to increase or decrease the feed by a larger or smaller diameter of screw. The screw conveyor is direct driven by a motor through a Jones gear reducer; the entire drive is suspended on the same frame as the screw.

The screw conveyor discharges to a short inclined belt conveyor, provided with a Dings' magnetic head pulley, over which the



Screw feeder underneath pulverized lime bin

Belt conveyor delivering sand and lime to mixture bin



Mixture bin contains enough for 100,000 brick

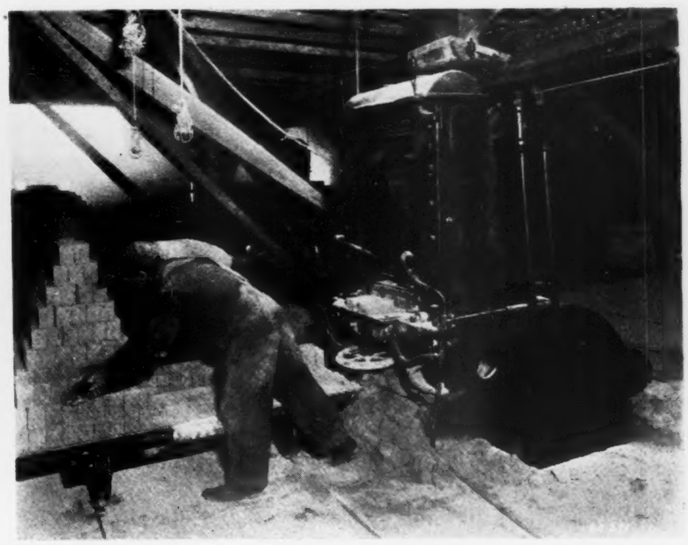
lime passes before going to a Sturtevant hammer mill. Direct connected to the hammer mill is a blower, the entire unit being driven by one motor. The arrangement for delivering the pulverized quick lime to a 250-ton steel storage tank was described in the July 26, 1924 issue of ROCK PRODUCTS. The storage bin rests on a concrete foundation which spans the main belt conveyor. It is equipped with a Sly dust collector making the entire operation absolutely dustless.

A screw feeder on the bottom of the pulverized lime tank draws the lime out and delivers it in a continuous feed on top of the sand carried by the main belt conveyor. A spray pipe is located over the belt and this is used when the sand becomes partly air dried so that there is not sufficient water left in it to complete the hydration of the lime.

The mixture of sand and lime, in proper proportion for making brick is delivered to a steel mix bin, which holds enough mix for making 100,000 brick. It is allowed to stand here over night so as to permit the lime to hydrate thoroughly and the moisture content to become sufficiently uniform.

Before going to the mix bin the sand and lime mixture is discharged into a mixing machine which consists of a series of knives on a central shaft revolving at high speed. The tendency of the knives is to cut the falling mix thoroughly, throwing it to two screw conveyors, one right hand, and one left, both discharging into a common hopper above the mix bin proper.

Below the mixture bin; disk feeder to rod mill



Brick press and truck for taking brick to the "kilns"

The mix from the bin is discharged to a Hadfield-Penfield disc feeder, serving a Jackson-Church 4x10-ft. rod mill.

The rod mill is a comparatively new development in the sand-lime brick industry and this one is the first to be direct motor driven through a Jones double gear reducer. The motor is 50 h.p., 1160 r.p.m. and the driven speed of the rod mill 127½ r.p.m., making the ratio 9 1/10 to 1. The rod mill is charged with 4 tons of rods ranging from 3 to 5 in. in diameter by 10 ft. long. The mill, motor and reduction gear weighs over 34 tons.

The mix is fed into the center of the mill and the discharge is at the periphery of the other end. The sand and lime are thoroughly ground so that every particle of sand is covered with lime. The grinding is so effective that it is possible to feed gravel and brick bats into the rod mill without danger of coarse material coming out.

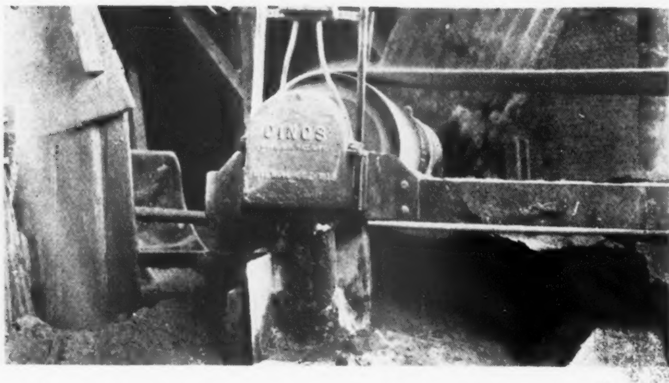
From the rod mill the mixture is conveyed by short belt conveyor over a Dings magnetic pulley to a bucket elevator. There has been no screening of raw materials at any point in the process. Tramp iron has always been a source of trouble and has only been eliminated by the use of a magnetic pulley. The company claims that the sale of the scrap iron removed will some day pay for the pulley. The saving in press breakage has paid for the pulley several times over, although it has been in use only for about 10 months to date.

From the magnetic pulley to the finished product there is nothing particularly new or novel. The mix is elevated by a bucket elevator to a point about 15 ft. above the top of the presses. It divides into two chutes leading to a platform over the presses. The piles to a platform feed down by gravity into the press. The two presses used are of the vertical type with a capacity of 3000 brick per hour. Each brick is stamped with the name of the company.

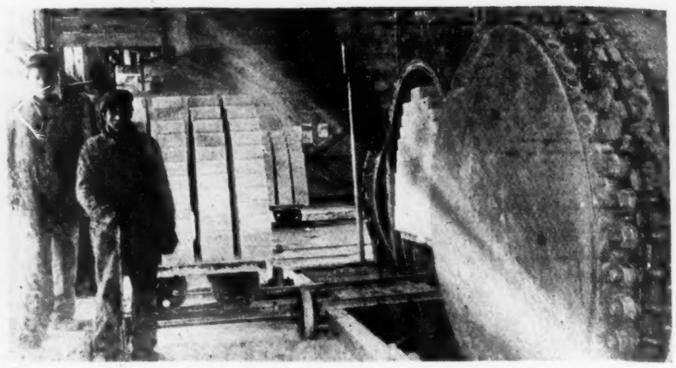
The pressure and mixture elevator remain as the only belt driven units in the plant. The company contemplates replacing these belts with direct motor drives. The wood balcony is to be replaced with steel storage bins over the presses.

The two hardening or steaming cylinders into which the "green" brick are put as soon as possible after coming from the presses, hold 23,000 brick each. After the heads of these kettles are closed, steam is turned into them at 125 lb. per sq. in. or full boiler pressure. After treatment for a period of about ten hours, the cars are pulled out by a hoisting engine on the yard tracks. From here they are loaded into trucks for delivery.

All motors are started and stopped by push buttons located at convenient points. Sometimes there are several places for stopping

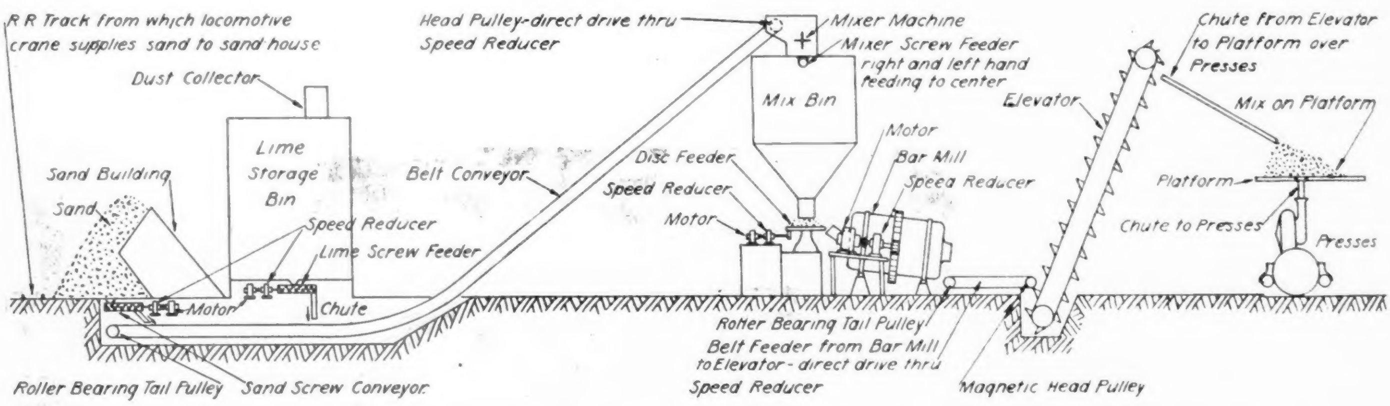


Magnetic pulley on conveyor feeding sand-lime mixture to presses



Kilns with cars of "green" brick from presses ready to treat

certain motors. The starters are so connected that it is impossible to start or stop machines except in correct order, so that no pile up of material is possible. All motors are protected by circuit breakers and no fuses are used. The circuit breakers are an integral part of the automatic starter.



Diagrammatic sketch of operations and equipment of the Sand-Lime Products Co.—Not to scale

All belt conveyors in this plant are equipped with either ball or roller bearings. Motors are all Wagner and Jones gear reducers are used throughout as standard equipment. The machinery is equipped with the Alemite system making possible good lubrication in the minimum of time.

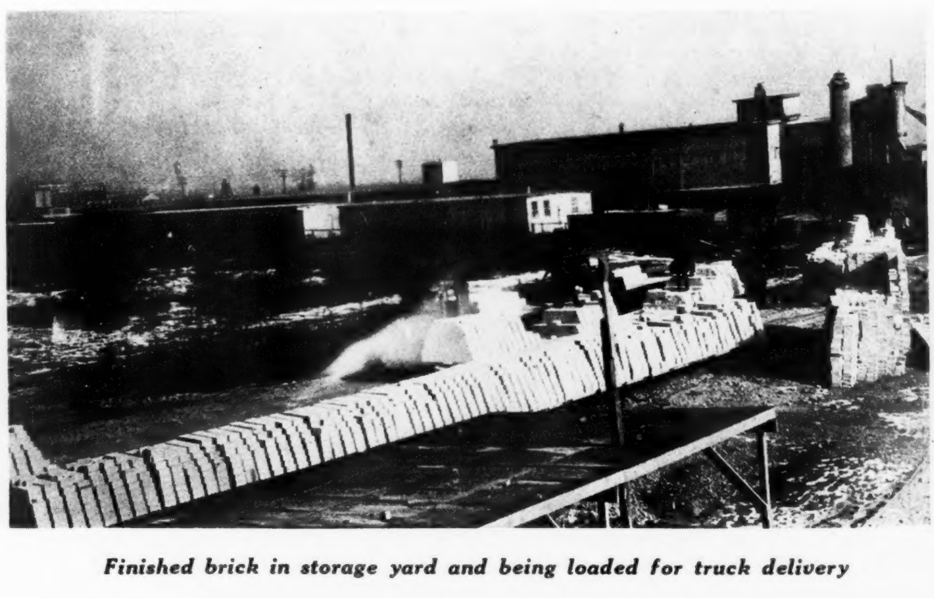
Gives Century Old Cement Patent Copy to Smithsonian Institution

A PHOTOGRAPHIC COPY of the original portland cement patent granted by King George the Fourth, of England, to Joseph Aspdin, of Leeds, October 21, 1824, was presented to the Smithsonian Institution, Washington, D. C., March 27, by the Portland Cement Association. The framed facsimile was formally presented by George A. Ricker, district engineer of the Association, and the response was made by Charles D. Walcott, secretary of the institution. The presentation was attended by government officials and association representatives.

The cement patent copy is an exact replica of the original which is still in the possession of the Aspdin family in England. This copy was brought to the United States by Sir Edward Airey, former Lord Mayor of Leeds, during his visit here last fall.

In a lower corner of the copy is the reproduction of the bronze tablet presented to the city of Leeds in 1924 by the Portland Cement Association in observation of the one hundredth anniversary of the invention of portland cement. The hand scroll work on the patent and the attached six inch wax "Great Seal of Great Britain" are interesting features of the copy. The facsimile is enclosed in a mahogany frame, about 40 inches square, which harmonizes with the other hangings in the Mineral and Mechanical Section of the National Museum, where it has been placed.

In making his product, Aspdin discovered the principle of proportioning the raw materials and pulverizing them before burning—contrary to practice in making earlier cements. He called his material "portland" cement because of its resemblance to rock from the Isle of Portland, a stone widely used in England in such structures as Westminster Abbey.



Finished brick in storage yard and being loaded for truck delivery

Remarkable Properties Claimed for New Gypsum Cement

American Consul at Glasgow, Scotland, All "Het Up" Over a Process for Making Hydraulic Gypsum Concretes and Plasters

CONSISTENT readers of this journal may recall an advertisement in the classified section of ROCK PRODUCTS, August 25, 1923, mentioning a startling new development in gypsum manufacture by a firm in Glasgow, Scotland. We believe what follows is more or less of a supplement to that advertisement. It comes from the office of the American consulate in Glasgow and a reading of it convinces one that it is written with genuine enthusiasm.

We, ourselves, believe that the claims made for the new product may not be at all overdrawn. We have always believed that the chemistry of lime, gypsum and cement is little known, and that the future holds out the possibility of important discoveries. We have no idea what our Scotch experimenters have found, but, as described in ROCK PRODUCTS, July 26, 1924, it is known that small amounts of lime intimately mixed with calcined gypsum give it hydraulic properties. This lime may be introduced by "over-burning" the gypsum, thus converting the sulphate to an oxide of calcium. What effect small quantities of other active mineral agents may have no one knows. The substance of the consul's report follows:

A New Process for Manufacturing Gypsum Cement and Plaster

This Consulate has noticed the appearance recently of a new white hydraulic gypsum cement that seems to have unusual properties, and enquiries of the producers have elicited information which, it is considered, cannot fail to excite interest among American manufacturers of cement and plasters.

It appears that the producers of this commodity, who are identified with one of the oldest established mining, merchanting and manufacturing firms in the west of Scotland, have been for some considerable time investigating the possibility of hitherto unsuspected properties in gypsum, and a little more than two years ago the result of their researches proved their suspicions to be well founded. In their earlier experiments certain discoveries were made and they proceeded to erect a large-scale experimental plant that has been running for the period named, turning out about twenty tons of the new cement per week, all of which has been and is being disposed of at a profit in Great Britain and Ireland, and the value of the production has been established to the satisfaction of every user of the new product.

The parties responsible for the invention are now busy arranging for the production of the new cement in comprehensive tonnage both in Great Britain and in Ireland. Negotiations for the establishment of factories in France and elsewhere on the continent of Europe are well advanced, and those interested are desirous of entering into similar discussions with American firms who have facilities for dealing with production in sufficient volume.

The housing shortage throughout Europe, and especially in the United Kingdom has to a certain extent been responsible for the rapid strides that have been made in the development of the new composition, and the initial efforts have been so successful that all of the experimental output has been sold and used for important reconstruction work and in new buildings. Recently officials of the Irish Free State have been negotiating for considerable amounts of the new plaster to be used in reconstruction work throughout the Free State. Committees of the Irish Free State have approved the new plaster for government work and it is evident that large quantities of the new plaster will be used throughout Ireland within the near future.

New Properties Claimed

The degree of improvement imparted to gypsum cement by the new process is best described, perhaps, in its specification terms. It is said to be isomorphous with dehydrated calcium sulphate as obtained by any other process, but is isomeric and, or (as the case may be), polymeric therewith, having certain notable new and improved properties: as are evidenced by, for example, its immunity from degeneration in the presence of that excess of water destructive of the useful properties of the gypsum cements of other processes; and in its greatly superior spatial disposition in comparison with the limitations, in that respect, of the gypsum cements of other processes.

This new commodity, known as "Astroplex," has compelled the approval and support of all the experts, engineers and tradesmen into whose notice it has come. During the past two years the producers have been concerned mainly in proving its worth and adjusting the finer details of the process so that every batch can be turned out perfectly and without variation. Nevertheless the unique properties of their product have forced it to the front, and it has been used and is being used in hundreds of buildings in Great Britain and Ireland for exterior as well as interior application. It is said, in fact, to be considered at least equal to to American white portland cement for all decorative purposes; and, inasmuch as its "set" is not affected detrimentally by disturbance, it is claimed to be a superior substance to the American commodity. The prices obtained for it are £8 10s ($40.46) per ton for No. 1 quality, and £5 0s ($23.80) per ton for No. 2 quality (the prices being converted at $4.76 per £). The difference in value being accounted for by color only, there being no difference in the cement values of the two grades.

A White Hydraulic Cement

Some of the peculiarities of this new cement, as claimed, sharply contrast it with the gypsum products now in use. The producers claim that it is a hydraulic cement and as such is serviceable as a hard finish plaster. They point out that all hard finish plasters must be subject to great care in application, and that makers in their advertising matter issue instructions as to the manner in which their products must be prepared for use and applied in practice. In contrast with such limitations it is claimed for this new cement that it is practically "fool-proof."

The producers say that it is ideally prepared for use by being mixed in a cistern with water like lime putty, and may be kept in that state for an indefinitely long period, being removed for use as and when suits the user, the only precaution necessary being a certain amount of agitation from time to time in order to prevent premature set. Old and new batches may be mixed together and thickened or thinned as required. A batch may lie on a plaster board for hours without harm, and at the end of a day's work any unused material may be returned to the cistern, or deposited under water, and used the next day or the next month without having lost any of its qualities.

It is claimed that no casual or deliberate misuse of water in any state of the cement's application has any effect whatever on its desirable properties. In spreading capacity on a surface, neat or with aggregate, it has at least twice the outcome of the highest figure claimed for the next best production. When used as a hard-finish plaster even if a mistake has been made by the operative during application the section plastered can

be removed and mixed back with another batch, or returned to the cistern for use later on.

Freshly Plastered Surfaces May Be Painted

Plastered surfaces may be trowelled to a hard marble-like finish and may be papered or painted within a very short while, there being no chemicals present in the mix injurious to decorative preparations. The producers are inclined to believe that American manufacturers will find it hard to believe many of the foregoing statements, but they have assured the writer that every statement they have made has been proven by repeated tests and they stand ready to convince any American firm that this new cement can prove any claim that they make for it.

Where it is used for exteriors it may be applied neat, but is usually made up with suitable sand in the proportion of one part cement and two parts sand. In that condition it is claimed that the concrete is an excellent imitation of the English Portland and Bath stones, and may be tooled by the sculptor with as great facility as the natural rock. In this condition the mixture may be trowelled to a steel-like finish, and outdoor steps made with aggregate in the proportions named have proved very durable.

It is further stated that an extension of the process, not yet brought up to the pitch of commercial utility, gives a cement that hardens to a flint-like consistency and presents a somewhat translucent fracture. The producers are following up this phase attentively and anticipate the accomplishment of their aim in the early future.

Strong as Portland Cement!

In tensile strength test briquettes show a breaking strain at 28 days (2 days dry and 26 days in water) considerably in excess of the minimum laid down in British Standard Specifications for portland cement. The producers argue no useful purpose is served in manufacturing their product for a greater strength than the British Standard Specification schedules, that being in excess of any ordinary decorative structural requirement, but they can manufacture, if required, a substance showing a breaking strain exceeding 700 lb. to the square inch at 28 days, a slight regulation of the process being all the attention required to accomplish the difference.

For Water and Oil Paints

Having perfected the new cement, the parties interested in it have turned their research on the material's usefulness in the manufacture of both water and oil paints. Experimentally, a water paint has been produced that is antiseptic and may be washed and scrubbed within 24 hours of its application to surfaces laid down with their cement. They have made an oil paint in small quantities that shows the same extraordinary spread as does the cement itself. In this department experiments are proceeding with satisfactory results.

The producers explain that where, in the proposals that are before them, the erection of new factories is contemplated, it is anticipated these may be set away in full swing, in units of about 1,000 tons per month, within six months of breaking ground. In most cases arrangements are afoot involving only the reconditioning of the "cooking" sections of existing hard-finish plaster factories, where units of the named tonnage can be set up and in working order within 30 days of the commencement of alterations. It is further stated that this "cooking" plant involves only moderate outlay.

The material has been subjected to the most rigorous tests in circumstances representing the extremes of heat and cold. It is suitable for use in any climate, is insect and vermin proof and is particularly suited to all tropical conditions. Numerous samples made with this cement are to be seen in the concern's Glasgow office, and these are undoubtedly very hard and strong, presenting the appearance of close-grained stone. Of special interest were some pieces about a quarter of an inch thick broken from a section plastered on wood to serve as a cleading in way of water, laid down last July and removed at the end of six complete months for examination. During the period the section was under water for the greater part of every day, nevertheless the fragments shown were sound and hard and obviously quite unaffected by the experience they had been put through.

See Wide Field

The producers are certain that the unique properties of this new gypsum cement as described will secure its almost universal use, and that the manufacture will rise to a very high tonnage per annum. The process would appear to bring a gypsum cement into fields of usefulness hitherto deemed to be the special conserves of the portland cement manufacturers. The producers claim that wherever it has been exhibited and tested, experts have conceded its claimed qualities. The producers further state that they are engaged in proving their claims almost daily, and are ready to demonstrate their cement's desirable peculiarities to those who are interested in the production or use of gypsum cement.

The attention of the producers was called to the recently reported experiment of the United States Bureau of Standards on the adhesion of gypsum plaster to concrete. They at once volunteered the information that adhesion to portland cement neat or to concrete surfaces was one of the features of their gypsum cement that made it popular for cheap housing, and that their material is in use daily in the neat state mostly as a skim-coat or finisher applied directly to such surfaces. The producers state that their cement shows less expansion than the highest grades of portland cement when subjected to the Chateliers' boiling tests, and that where applied in conjunction with portland cement neat or concrete it has never disclosed the slightest tendency to cracking.

The company making the new process cement is under the direction of Robert Robertson, 68 Gordon Street, Glasgow, Scotland.

Invents New Machine to Make Gypsum Blocks

ONE of the most complete machines invented for the manufacture of gypsum building blocks has been patented by a Los Angeles inventor, J. F. Caldwell, according to William Smith, manufacturer, of Pasadena, Calif., who is financing the invention.

Each machine, of which there are four complete and 10 under construction, now turns out 24 ft. of the blocks at each operation, requiring the services of only one man to four machines.

According to Mr. Caldwell, 12 of these machines will make 10,000 ft. of blocks a day with a crew of from twelve to fourteen men. Under the old method 50 laborers were necessary to accomplish this amount of work. Approximately 75% of the partitions of the larger buildings constructed in Los Angeles during the past year and a half were of gypsum blocks.

A building with 50,000 ft. of floor space has been erected at a cost of $50,000 for the manufacture of these blocks on a large scale.—*Los Angeles (Calif.) Times.*

U. S. Gypsum to Enlarge Sweetwater, Texas, Plant

FOR the second time since it went into operation last May the United States Gypsum Co. will enlarge its plaster and sheetrock plant at Sweetwater, Texas, this spring. In February new equipment was installed which increased daily output of fireproof wallboard 50%. New improvements will add 100% more. With purchase in January of 275 acres of mineral bearing land adjoining the company's other property, these expansions will increase the investment in Texas by several hundred thousand dollars. Increased building activity in southwest and adding of several new products make expansion necessary.—*New York Wall Street Journal.*

To Set Standards for Plasterboard and Plaster Lath

EXPERIMENTS and research study will be undertaken under the direction of Prof. R. M. Fox, of the University of Southern California civil engineering department to set standards for plaster lath and plasterboard at a special testing laboratory at the university, according to O. D. Goerz, member of the general committee of plaster board industries.

Civil engineering students at the university will conduct fire tests, technical analyses of the products, develop new uses and make experiments to determine the maximum stress capacity of plaster lath and plasterboard. Prof. Fox will supervise all experimentation work.—*Los Angeles Times.*

Mining and Utilization of Tennessee Phosphate Rock*

By Richard W. Smith

Assistant Geologist, Tennessee Geological Survey, Nashville, Tenn.

THERE are three distinct varieties of phosphate rock, in Tennessee, known commercially as: (a) the "brown" rock, which is the residual product of the weathering and natural concentration of certain phosphatic Ordovician limestones; (b) the "blue" rock, which is an unaltered phosphatic stratum of Mississippian or Devonian age; and (c) the "white" rock, which is the result of chemical replacement and deposition.

Discovery of Brown Phosphate

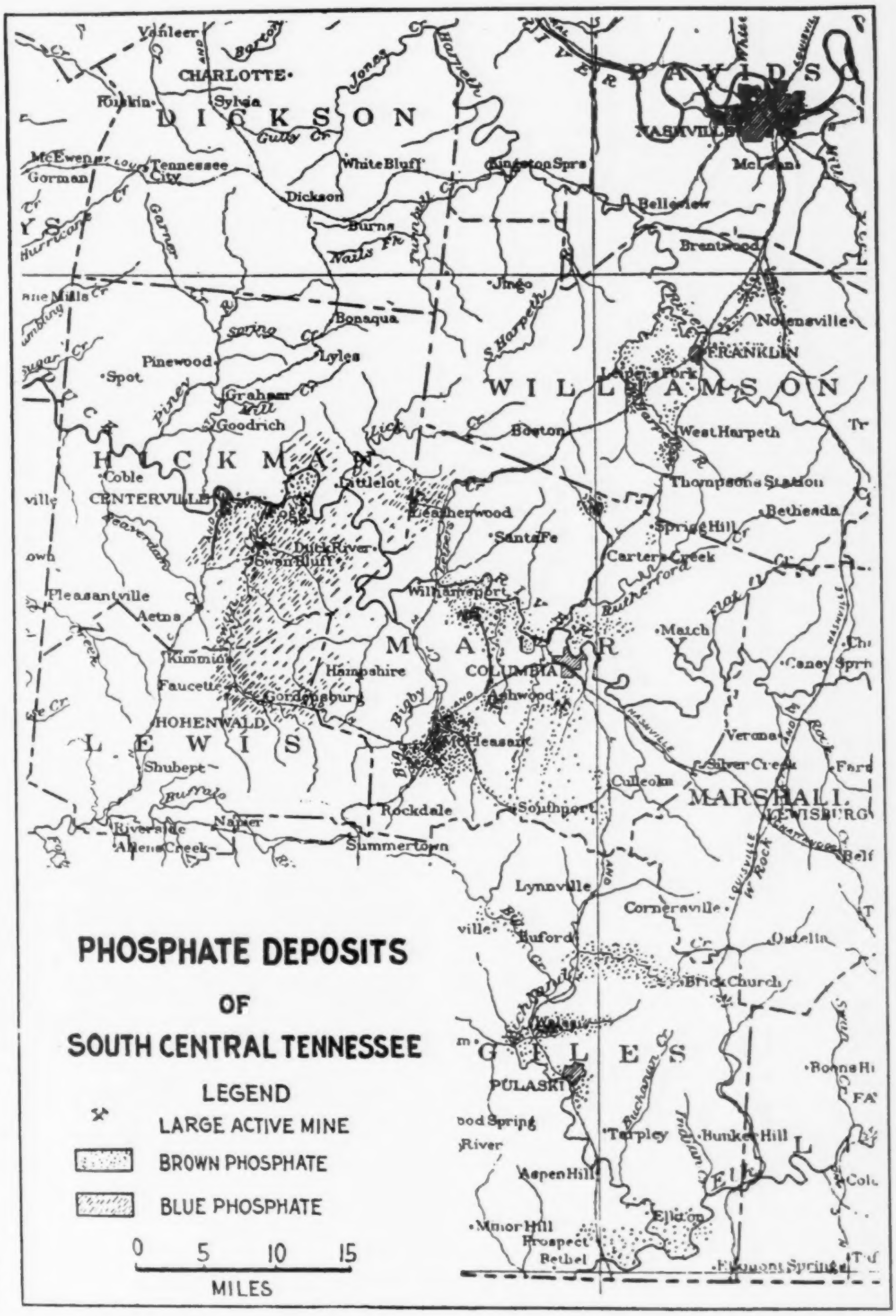
In January, 1896, Judge S. Q. Weatherly, who was interested in the development of the blue phosphate, while riding along the road south of Mt. Pleasant, noticed some slabs of brown rock in place above the limestone. He took samples, and had them analyzed, thus discovering the high-grade brown phosphate of this district. This discovery was kept a secret until July, 1896, when mining was started at the village of Mt. Pleasant. Development proceeded rapidly, many owners obtaining their capital by the sale of their rock fences, which were largely composed of slabs of high-grade brown phosphate.

The development of the brown rock, which is richer and more easily mined than the blue, caused Tennessee to advance from a poor third in production to second, surpassing the output of South Carolina, and being exceeded only by Florida.

Brown-rock deposits lie near the surface and are easily worked in open pits. The overburden of soil, clay, and slightly phosphatic muck varies in thickness from almost nothing to such a thickness that its removal is unprofitable. It is generally considered that the economic limit is 6 ft. of overburden for every foot of phosphate found; but of course this depends on the selling price of phosphate, the cost of labor, and the mining methods used.

Mining and Treatment of Brown-Rock Phosphate

In the early days of the industry, mining was done entirely by hand. The overburden was removed by hand or by horse scrapers. The phosphate was loosened with a pick and the lumps were shoveled into carts with a "spall fork;" the rich phosphate sand or "muck" and the smaller lumps that would pass through the tines of the fork were allowed to go to waste. Where the deposit occurred on a slope, a face was usually



Map showing location of Tennessee phosphate mines and deposits

*Abstract of paper presented at A. I. M. E. meeting, Birmingham, Ala., October, 1924. Published with the permission of the Tennessee Geological Survey in Mining and Metallurgy. This paper is a synopsis of a detailed report in preparation for publication by the Tennessee Geological Survey

started on the lower end and wcrked toward the upper; the overburden being undermined was allowed to fall in on the worked ground and shoveled back.

Before shipping, the rock was dried by piling up on wood, which was then ignited; or by spreading it on the ground in the sun for several days and turning it repeatedly with a plow. With the coming of the larger companies, these crude and wasteful methods were gradually replaced by modern machinery; but they are still used to some extent by individuals mining small and isolated tracts for the lump rock only.

Modern Mining Methods

The larger companies now strip the overburden by drag-line excavators using a 1½ to 2½ cu. yd. Page scraper bucket on a 50- to 85-ft. boom. The overburden is stripped from a long area, the width of the reach of the machine, and dumped on previously mined over ground at one side.

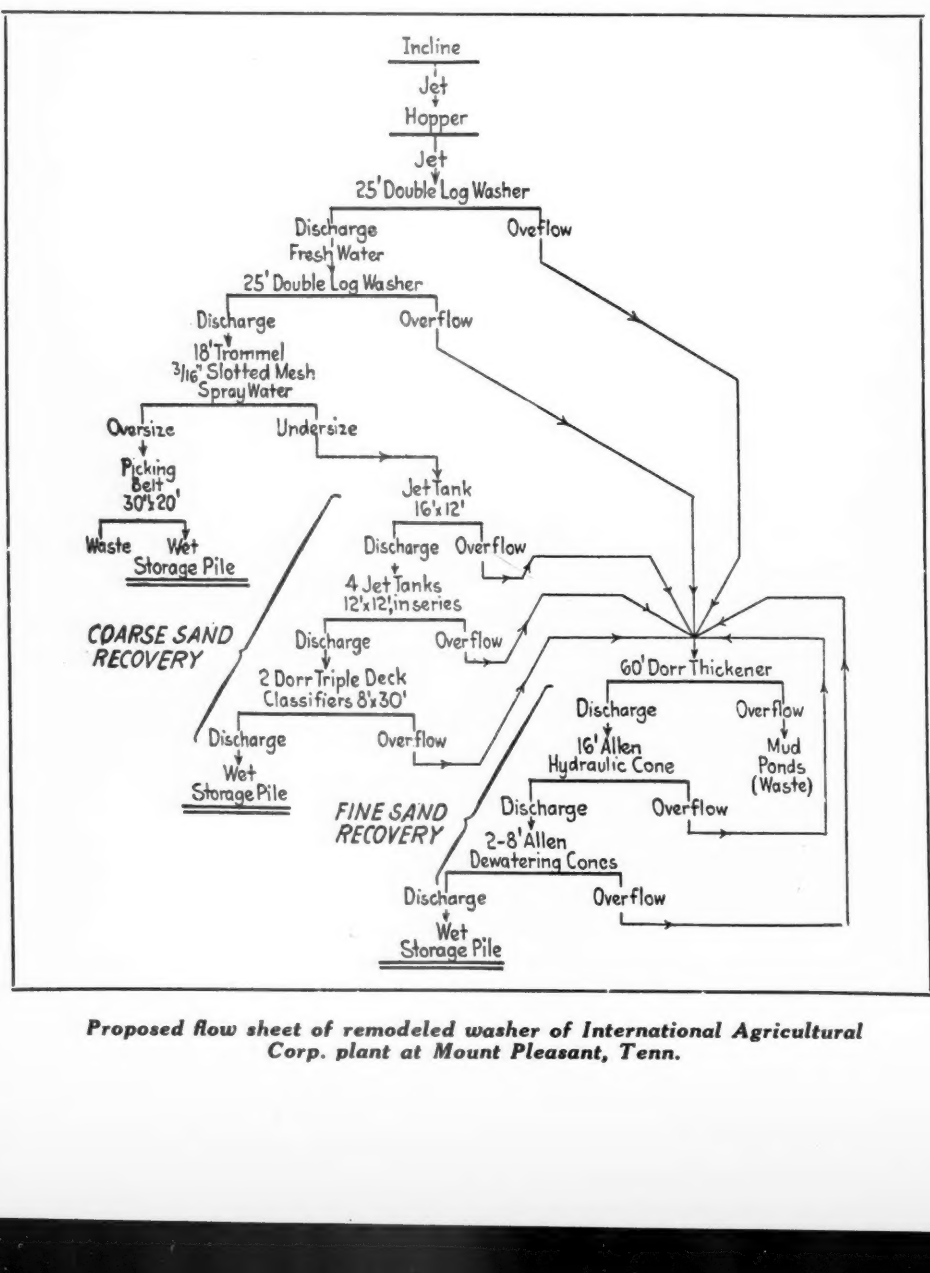
The entire thickness of the phosphate horizon, lump rock, muck and all, is mined. Where it is thick enough, drag-line excavators are used for the mining; but where the phosphate is thin or occurs in the narrow "cutters" or underground drainage channels between "horses" of limestone, it is mined by pick and shovel with negro labor. One phosphate company at Mt. Pleasant has designed a machine, called the "cantilever," resembling a traveling crane, for raising hand-filled buckets from deep or narrow cutters and dumping them into the tram cars.

Steam shovels have been tried for both mining and removing the overburden, but because of their limited reach, in comparison with the drag-line excavators which mine to a depth of 40 to 50 ft., their use has been abandoned.

The material is transported to the washers by tram haulage, using 10- to 18-ton dinky locomotives on a 36-in. gage line. Either 3-yd. end dump or 4-yd. side dump cars are used.

Hydraulic Mining

At one mine, where the topographic conditions are favorable, the overburden is stripped and the phosphate is mined by hydraulic methods similar to those of the Florida phosphate field. Two streams of water are used with 10-in. nozzles with 1-in. openings. The water is under 120 lb. pressure. After the overburden has been washed into the previously mined-over territory, the phosphate is washed to a depression, or "sump," where it is picked up by a hydraulic jet and carried to a centrally located pump. Here the larger lumps are caught on a 4-in. grid, and the material is pumped to a point from which it can flow to the washer in a trough. With this method some trouble has been experienced by flint and iron nodules in the overburden settling down on top of the phosphate horizon instead of flowing off with the overburden as it was removed.



Proposed flow sheet of remodeled washer of International Agricultural Corp. plant at Mount Pleasant, Tenn.

Washing Methods

The muck, or unconsolidated portion of the phosphatic stratum, is a mixture of phosphatic sand and clay, and has a phosphate content of from 30% to 60% bone phosphate of lime. As the fertilizer manufacturers demand phosphate running 72% bone phosphate of lime or over, and with impurities of iron and alumina less than 6%, this material cannot be utilized without washing out the clay and thus concentrating the product until it meets the requirements.

The first attempt at washing brown phosphate was made by the old Tennessee Phosphate Co. at Mt. Pleasant, in 1899 or 1900. This was simply a log washer for cleaning the lumps of their adhering clay. No attempt was made to save the fine material, with the result that the old mud ponds of the washers of this type contained material running from 40% to 60% bone phosphate of lime; most of these have since been reworked at a profit. In 1907 the Independent Phosphate Co. made the first attempt to save the fine material by running the wash water from the log washer through long troughs that settled the coarsest of the phosphate sand. When the plant was shut down, the sand was shoveled out of the troughs. From this time on, considerable attention was given to saving the fine material and improvements were gradually made, until today the washing plants are large and complicated, and the recovery is relatively perfect.

The cost of production varies considerably among the different companies and fluctuates from time to time. James A. Barr, engineer for the International Agricultural Corp., has furnished the following estimate for the general cost of production in the Mt. Pleasant field in 1923:

	Cost per long ton
Stripping overburden	$0.50
Mining	0.75
Transportation to washer	0.20
Washing	0.75
Drying	0.75
Shipping and track expense	0.10
Working cost	$3.05
Capital reserve for rock depletion	0.75
Insurance, overhead, depreciation of equipment, etc.	1.00
Total cost per long ton	$4.80

If the rock is not owned outright a royalty of $0.50 to $1.00 per long ton must be substituted for reserve for rock depletion.

Uses of Phosphate Rock

The greater part of the phosphate rock mined in Tennessee is made into soluble "acid phosphate" in various fertilizer factories, located near the market, by treatment with an equal amount of sulphuric acid. In this form, a maximum amount of phosphorus is immediately available as a plant food; it may be used alone or as the basis for complete fertilizers. Most of the larger phosphate-mining companies in Tennessee have their own fertilizer factories scattered over the Southern and Middle Western states.

The Kreiss Process

A recently patented process, called the A. L. Kreiss process, produces a phosphorus-potash fertilizer by fusing phosphate rock with soluble potash salts in a rotary cylindrical kiln at temperatures of 850 deg. to 1300 deg. C. The product is a soluble calcium-potassium phosphate that is said to have the advantage of correcting rather than adding to the acidity of a soil. A plant using this process has been in operation for several years at Lakeland, Fla., making a product that is said to give very satisfactory results to the consumers; it is expected that the process will soon be in operation in Tennessee.

It has been demonstrated[1] that on certain soils phosphate rock, when finely ground and mixed with the soil along with humus in the form of manure or plowed-under crops, becomes available slowly, perhaps through the action of bacteria and the weak acids formed by the decomposition of the organic matter. At points to which freight rates are not too high, the phosphorus is much cheaper in this form, but the result is a gradual building up of the soil rather than a forcing of the immediate crop. To meet this demand, some of the Tennessee phosphate is finely pulverized and sold direct to the farmers, particularly in the Middle Western states, such as Illinois, where the State Agricultural Experiment Station has strongly recommended the use of raw ground-rock phosphate.

Raw ground-rock phosphate is finding an increasing use as one of the ingredients of cattle feed, for the purpose of furnishing the necessary phosphorus for bone and tissue building. In 1923, over 20,000 tons of ground phosphate rock were shipped from Tennessee to various feed companies in the United States.

Metallurgical Uses

There has been an increasing demand in the last few years for high-grade lump rock for use by steel plants in the United States to raise the phosphorus content of the steel to the required limits. There has also been an increasing demand for ferrophosphorus, largely used by foundries and basic open-hearth furnaces to obtain the correct phosphorus content in their products. By the use of ferrophosphorus, the phosphorus content of the steel can be easily adjusted without changing the grade of the product. For example, the low phosphorus steel produced in the basic open-hearth is a disadvantage in the manufacture of tinplate, because the steel sticks together when rolled double.

Ferrophosphorus

The entire production of ferrophosphorus in the United States is by two furnaces; the Rockdale Furnace at Rockdale, Tenn., six miles south of Mt. Pleasant, and the Federal Phosphorus Co., at Anniston, Ala. The Rockdale Furnace is a 55-ft. stack, four-stove blast furnace owned and operated under patents by J. J. Grey, Jr. It is charged with coke, lump phosphate rock, siliceous Tennessee brown-iron ore, and some mill cinder and limestone. The fundamental principle involved is that at temperatures of 1300 deg. to 1500 deg. C., with the reducing conditions maintained by carbon or coke, silica assumes the properties of a relatively strong acid in so far as its ability to combine with bases is concerned and, therefore, it can displace the phosphoric acid of phosphate rock forming silicates of lime and free phosphoric anhydride (P_2O_5). By the reduction power of the incandescent coke, elemental phosphorus is produced, which is absorbed by the molten iron. The result is an iron containing from 16% to 22% phosphorus. It is cast in slabs, instead of pigs, and is broken into convenient lumps. The slag is pulverized by pouring into cold water, and the adhering ferrophosphorus is recovered by magnetic separation.

Electric Furnaces and Chemical Uses

The Federal Phosphorus Co. obtains the same results by using an electric furnace, thus avoiding infringement of Mr. Grey's patents, which cover the blast-furnace production only. In addition, by maintaining an excess of phosphate rock over that required to saturate the molten iron, it obtains fumes of phosphoric anhydride (P_2O_5), which are collected by a Cottrell precipitator, in the form of liquid phosphoric acid containing 55% H_3PO_4 for chemical uses.

In addition to the phosphoric acid produced at Anniston, a small amount of the best grade of Tennessee phosphate is made into chemically pure phosphoric acid for chemical use.

The Victor Chemical Co. of Nashville, Tenn., is making monocalcium phosphate for use in self-raising flour.

The easily mined high-grade deposits of Tennessee are rapidly becoming exhausted. The problem of the future is how to utilize the vast deposits of lower grade material. The Bureau of Soils has done considerable experimenting on the use of an electric furnace or a modified blast furnace to produce phosphoric acid by its volatilization and collection by a Cottrell precipitator. The results of these experiments[2] indicate that such a process will be commercially feasible provided that certain mechanical difficulties can be remedied, such as the chilling of the highly siliceous slag on the hearth.

Phosphoric Acid by Volatilization

Such a process will have the following advantages over the sulfuric acid method of producing soluble phosphate:

1. As the presence of silica is necessary in the process, low-grade siliceous phosphates that are unfit for sulfuric-acid treatment can be utilized; there are vast quantites of such siliceous phosphates in Tennessee.
2. Run-of-mine material can be used, dispensing with the costly step of washing the rock, which entails the loss of so much phosphate.
3. The furnace process calls for no sulphuric acid, which under present conditions is hauled to the fertilizer plants as acid and hauled away again as gypsum in acid phosphate.
4. By using the furnace process near the phosphate mines, it is possible to produce a relatively concentrated product that can stand heavy handling charges and the cost of long freight hauls.

Possibilities of Manufacturing Fertilizer at Muscle Shoals

There has recently been considerable discussion of the possibility of manufacturing nitrate fertilizer on a large scale at Muscle Shoals. If this is done, the most logical way of marketing it would be in the form of complete fertilizers of the ordinary type, or super-strength if the market can be educated to use them. In Tennessee, within a radius of 30 to 70 miles of Muscle Shoals, are vast deposits of low-grade siliceous phosphate suitable for the furnace process just described. An electric-furnace plant using electric power from Muscle Shoals could be located at the mines and the liquid phosphoric acid used to treat ground phosphate rock to make triple superphosphate, to which the nitrates could be added in making nitrogenous fertilizers.

The increasing demand for high-grade lump rock for the steel trade and the production of ferrophosphorus will soon be hard to meet. The fine material cannot be used because it sifts down through the charge in the furnace. At present, a number of the phosphate companies are experimenting on processes for briquetting the fine material to supply this demand.

[1]W. H. Waggaman and C. R. Wagner: Analysis of Experimental Work with Ground Rock Phosphate as a Fertilizer. (1918) U. S. Dept. Agr. *Bull.* No. 699

[2]W. H. Waggaman: Investigations of the Man ufacture of Phosphoric Acid by the Volatilization Process. (1923) U. S. Dept. Agr. *Bull.* No. 1179.

Rock Products Activities of the United States Bureau of Standards

Long-Time Tests of Unsound Cement—Limestone Dust for for Stone-Setting Mortars—Effect of Stirring on Time of Set of Gypsum Plasters

EARLY in 1919 considerable interest was manifested in certain cement which had failed to meet the soundness test called for in the specifications. The usual cement tests were carried out on it by the Bureau, and concrete cylinders were also prepared for various conditions of storage. Some additional briquettes were made for long-time observation and test. As a matter of interest parallel tests were made from another lot of cement of a different brand which complied with the requirements for soundness. The results of the tests, which now include those made after six years storage under different conditions, are as follows:

COMPRESSIVE STRENGTH OF 1:½:3 CONCRETE (LB./SQ. IN.)

Cement	Age	Moist air	Storage: 28 day moist air. Thereafter laboratory air	Storage: 28 day moist air. Thereafter outside air
Unsound	7-day	1700	....	....
	28-day	2090	....	....
	3 mo.	....	2810	2800
	1 yr.	....	3440	3270
	2 yr.	....	2940	2740
	6 yr.	....	3180	4400

COMPRESSIVE STRENGTH OF 1:½:3 CONCRETE (LB./SQ. IN.)

Cement	Age	Moist air	Storage: 28 day moist air. Thereafter laboratory air	Storage: 28 day moist air. Thereafter outside air
Sound	7-day	1440	....	....
	28-day	2270	....	....
	3 mo.	....	3060	2240
	1 yr.	....	2960	3090
	2 yr.	....	2310	3000
	6 yr.		No specimens	4780

TENSILE STRENGTH OF 1:3 STD. SAND BRIQUETTES (LBS./SQ. IN.)

Age	Unsound cement: Water storage	Unsound cement: Lab. air storage	Sound cement: Water storage	Sound cement: Lab. air storage
7 days	235	......	293	......
28 days	342	......	422	......
6 years	321	131	388	446

Condition of Specimens

Examination of the specimens at the 6-year test period resulted in the following observations:

The unsound cement specimens which had been stored indoors showed no apparent peculiarity.

The unsound and two of the sound cement concrete specimens stored under outdoor conditions had developed cracks, most of a circumferential nature. Some of these cracks, as judged by the appearance of the interior of the specimen after test, had extended to a depth of several inches. The cracking appeared more pronounced for the unsound than for the sound cement.

The briquettes in water storage did not show any signs of disintegration. The briquettes made from the sound cement and stored in the laboratory air appeared free from disintegration. Those in similar storage, but made from the unsound cement, were badly disintegrated. The outer portions could readily be broken off by the fingers to a depth of about ¼ in. This behavior has been noted in similar tests of other unsound cement.

Remarks—No conclusions are drawn either as to the cause or effect of "unsoundness," but a question is presented and some facts have been noted which are of interest in the testing of cement and concrete.

(1) Is the tendency of an unsound cement mortar briquette to disintegrate, when in dry air storage, also present in concrete, only to a lessened degree?

(2) The tensile specimens in water storage show the retrogression not uncommon in similar long time tests. The air storage specimens for the sound cement show an increase in strength over the specification 28-day test, while those of the unsound cement show a great decrease. In neither case does the tensile strength behavior bear any constant ratio to the concrete strength.

The Use of Limestone Planer Dust in Stone-Setting Mortars

As a part of the Bureau's research work in limestone, various stone setting mortars are now being investigated, and one of the interesting developments relates to mortar made up with limestone planer dust in place of building sand. The so-called "planer dust" is the waste product resulting from the machine preparation of limestone when planers, shapers, and milling machines are used. While much of the material is already relatively small sized, the coarser particles are screened out when its use in mortar is intended, and the final substance becomes considerably finer than building sand. Mixed with white portland cement in 1:3 proportions by volume, the planer dust mortar has been in satisfactory use for many years in some localities although but little has been known of its properties.

Tests made in this investigation indicate that about 80% of the 28-day strength of a 1:3 white cement planer dust mortar is developed in 24 hours. Compared with building sand mortars, the planer dust combinations have shown from 125 to 200% greater compressive strengths at 28 days according to the conditions of storage. The bonding power appears to be about equal to that of the usual mortar, while the workability is possibly a trifle better. Considering these points it would seem that the use of limestone planer dust in mortar would be quite advantageous in setting limestone, particularly for local contractors engaged in both cutting and setting the stone.

The Effect of Stirring on the Time of Set of Gypsum Plasters

In construction work mechanical mixers are seldom used in making up gypsum plasters as it is found that the plaster usually sets before it can conveniently be applied to the wall. A study has been made of this problem in order to determine what causes this apparent acceleration of the time of set.

A small revolving drum type mechanical mixer was constructed, and mixes of plaster were made, using several brands of calcined gypsum. In each case a 1:2 gypsum sand mix was employed. The rate of stirring and also the time of stirring were varied, but in no instance was there any appreciable acceleration of the time of set of the mortars. After each mix the machine was thoroughly cleaned.

When the mixer was not cleaned, in other words, when the set gypsum was present, there was a marked acceleration of the time of set of the mortars. In order to determine quantitatively the acceleration due to set materials, mixes were made using calcined gypsum which was retarded at the mill and to which definite amounts of set gypsum, ($CaSO_4 2H_2O$) were added. The amounts employed were from 0.1% to 5.0%, based on the weight of the gypsum.

It was found that the acceleration of time of set increased rapidly with additions of set gypsum until about 1.0% was reached, after which the increase was not so marked.

From these results it would seem that mechanical mixing could be employed in making up gypsum mortars if the mortars could be kept free from set gypsum. This could be accomplished by a thorough cleaning of the mixer after the mixing of each batch or by the use of material retarded so as not to set during the working day. In either case it is imperative that no material be allowed to remain in the drum of the mixer long enough to set.

How Good Roads Are Stimulating New Mineral Industry

North Carolina Geological and Economic Survey Sees Bright Future for Rock Products Industry

HOW the road-building program in the State of North Carolina has increased values, encouraged industry, animated business and intercommunication in the state itself and between the state and other commonwealth is an oft-told story, say *National Resources* of the North Carolina Geological and Economic Survey. The ramifications of influence of easy transportation on wealth and applied energy, on development of resources and accentuation of life values do not disappoint the imagination to which they make appeal.

Less evident is the fact that the road in the making as well as the completion is building up and putting on a secure foundation of independence a highly important use of a widespread natural resource heretofore very largely neglected.

In other words, the millions invested in roads have to a great extent been expended in materials obtained at home as well as in the wages paid the army of workers and the business created for the contractors who lay them down. North Carolina roads, in other words, are built of North Carolina stuff, the demand for which has created a new and important line of effort and domestic economy.

Utilizing Sand and Gravel

This resource and commercial activity has to do with sand and gravel. Since 1921 the Highway Commission has been following up an intensive program of road building, including hard-surface and topsoil or sand and clay roads and the bridges necessary to their construction. The hard-surface roads and the bridges require crushed stone and washed sand and gravel as an aggregate for portland cement concrete and for bituminous concrete and sheet asphalt types. According to figures furnished by the State Highway Commission to the North Carolina Geological Survey, during the twenty-nine months beginning in the summer of 1921 and ending with 1923, a total of 1861.1 miles of hard-surface and sheet asphalt roads had been completed, together with their bridges and culverts, in addition to numerous structures on roads of different type.

In the building of these roads for the period mentioned there were required approximately 4,498,314 tons of crushed stone, gravel and sand, which had a value at the quarry or pit of $6,834,301.

Of this amount only 608,871 tons, with a value of $979,562, or approximately one-seventh of the material that went into roads and bridges, came from neighboring states, chiefly Virginia, South Carolina, and Tennessee.

This means that of actual material used in the road-building program for the period 1921-1923 North Carolina stone, gravel and sand industries furnished a value of $5,854,739 as against a value of $979,562 procured from like industries elsewhere.

This is a remarkable record when it is considered that stone, gravel and sand industries were well established in the three states mentioned, while in North Carolina they had languished and were only stimulated into activity when the road building program was undertaken. In many cases these more experienced concerns in Virginia and South Carolina were located as close to road projects in this state as many of our own pits and quarries, while purchases were made entirely on a competitive basis and no discrimination shown in favor of North Carolina operators.

Industry With a Future

During this period, 1921-1923, the total production of stone, sand and gravel in the state amounted to $11,312,086, more than twice the amount used by the State in the making of roads. The greater part of the material used in road building came from quarries and pits included in the above figures, but there was also considerable material produced locally that was never reported through commercial pits and quarries, which if properly accounted for would make the values of these commodities to the state considerably greater than the above figures indicate.

It will appear from the above that although road building is using about half the crushed stone, sand and gravel produced in the state, the other half is of a value sufficient to make of considerable importance an industry founded on a natural resource which it took the road-building program to energize. It is reasonable to suppose that the ability of North Carolina producers to compete on even terms with like industries in other states which have been longer established means that their market will broaden constantly and that they will not only absorb a greater proportion of domestic business but expand abroad. This deduction follows not only from the fact of the ability of the producer to supply the great part of the demand occasioned by the new roads but from a wide distribution of material throughout the state.

Road Material Distribution

Granites and limestones suitable for crushing purposes have a wide distribution throughout central, Piedmont, and western North Carolina, and in the case of quartz and granite gravel the occurrence is across the state in a belt closely corresponding to what is known as the "fall line." This, roughly, extends from Garysburg, through Northampton county, Selma, Lillington, Carthage, Lilesville and Anson county. Sands suitable for use with cement for the making of concrete occur in the main along the gravel belt and in abundance at different places in the state west of the "fall line." Such sands must be of a certain coarseness, which rules out many of them, notable those so abundant in the Coastal Plain, on account of their fineness.

In addition to the use of crushed stone, sand and gravel for road making purposes and as constituent parts of cement, there are several opportunities for special uses of sand, as in the foundry industry, which may be expected to be developed as the industry expands and seeks new markets.

The Cement Question

There remains to be found a practical way of turning the state's natural materials now used along with portland cement into the cement itself. Cement means a limestone and clay subjected to special treatment. For this purpose the stone used may be any solidified limestone, as marble or crystalline forms, or shell. The clay may be soft, shale, or clay schistose rock, and must have a high aluminum content. There is in the state an abundance of suitable clays, but the limestones have been too high in magnesium carbonate to be utilized in the manufacture of cement in accordance with established practice. More recently, however, experiment has shown that the presence of magnesium carbonate is not the insuperable objection it had been supposed, and there is therefore opened the possibility of home manufacture of cement as well as home supply of material to mix with it in the making of roads.

Once the availability of this type of limestone is definitely established, there will be found ready the abundant deposits of dolomitic limestones occurring in Cherokee, in the Cherokee and Nottely River Valleys to the Georgia line, in the Peachtree and Brasstown marbles, the so-called Andrew schist, and elsewhere.

Portland Cement Output in March

With Estimates of Total Cement Output and Value, by States and Districts, and Shipments of Portland Cement from Mills into States, 1924

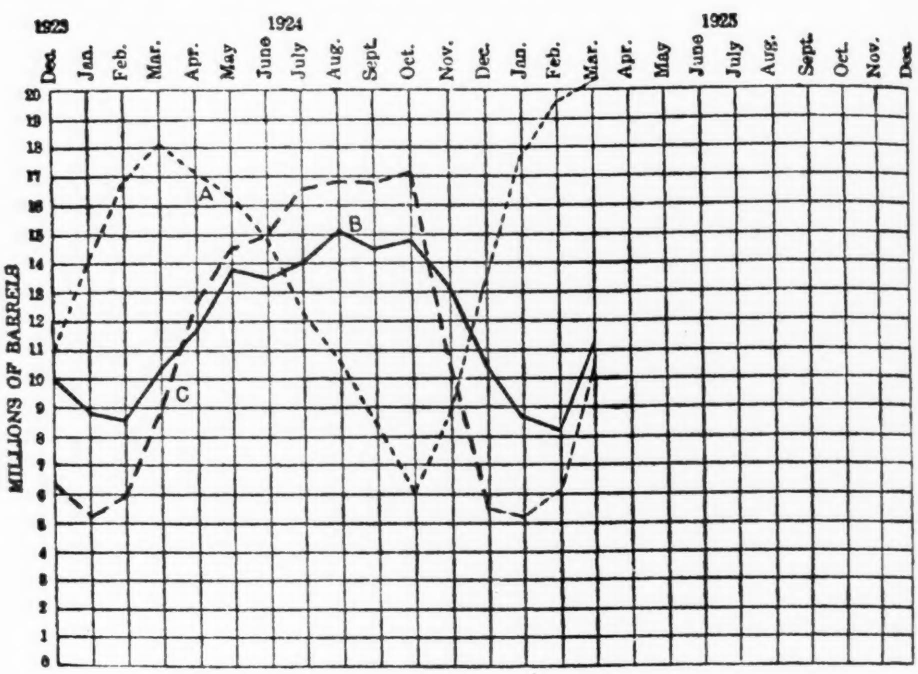
THE following tables, prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on the reports of producers of portland cement. The March, 1925, totals include estimates for two plants. March production exceeds that for all corresponding months; shipments for March were exceeded slightly in the corresponding month in 1923, and stocks were the highest ever recorded.

Stocks of clinker, or unground cement, at the mills at the end of March, 1925 amounted to about 9,969,000 bbl. compared with 8,497,000 bbl. (revised) at the beginning of the month.

The imports of hydraulic cement in February, 1925, amounted to 119,077 bbl. valued at $206,308, compared with 162,930 bbl., valued at $219,588 in February, 1924.* The total imports in 1924 amounted to 2,010,936 bbl. valued at $3,116,564.

The imports in February were from Belgium, 75,677 bbl.; Denmark, 31,700 bbl.; Norway, 11,253 bbl.; France, 244 bbl.; Canada, 203 bbl.

The imports were received in the following districts: Porto Rico, 26,470 bbl.; Florida, 25,390 bbl.; Los Angeles, 24,509 bbl.; Massachusetts, 9,395 bbl.; Oregon, 9,258 bbl.; Washington, 8,947 bbl.; San Francisco, 7,995 bbl.; New York, 5,760 bbl.; other districts, 1,353 bbl.



(A) Stocks of finished portland cement at factories. (B) Production of finished portland cement. (C) Shipments of finished portland cement from factories

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN MARCH, 1924 AND 1925, AND STOCKS IN FEBRUARY, 1925, IN BARRELS

Commercial district	Production—March, 1924	Production—March, 1925	Shipments—March, 1924	Shipments—March, 1925	Stocks at end of March, 1924	Stocks at end of March, 1925	Stocks at end of February, 1925*
E'n Penn., N. J. & Md.	3,087,000	3,054,000	2,425,000	2,758,000	4,729,000	5,042,000	4,746,000
New York	460,000	484,000	272,000	445,000	1,258,000	1,272,000	1,233,000
Ohio, W'n Penn. & W. Va.	863,000	816,000	661,000	776,000	1,936,000	2,017,000	1,977,000
Michigan	510,000	566,000	429,000	428,000	952,000	1,299,000	1,161,000
Wis.,† Ill., Ind. & Ky.	1,438,000	1,406,000	1,264,000	1,214,000	2,954,000	3,739,000	3,547,000
Va., Tenn., Ala. & Ga.	837,000	1,064,000	799,000	1,048,000	797,000	706,000	689,000
E'n Mo., Ia., Minn. & S. Dak.‡	872,000	887,000	952,000	864,000	2,788,000	3,271,000	3,248,000
W'n Mo., Neb., Kan. & Okla.	618,000	867,000	580,000	803,000	1,265,000	1,562,000	1,498,000
Texas	346,000	422,000	351,000	422,000	396,000	342,000	343,000
Colo. & Utah	104,000	101,000	122,000	168,000	211,000	304,000	372,000
Calif.	978,000	1,128,000	908,000	1,082,000	370,000	514,000	468,000
Ore., Wash. & Mont.	257,000	239,000	232,000	271,000	533,000	376,000	407,000
	10,370,000	11,034,000	8,995,000	10,279,000	18,189,000	20,444,000	19,689,000

*Revised. †Began producing and shipping June, 1924. ‡Began producing December, 1924, and shipping January, 1925.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1924 AND 1925, IN BARRELS

Month	Production 1924	Production 1925	Shipments 1924	Shipments 1925	Stocks at end of month 1924	Stocks at end of month 1925
January	8,788,000	*8,856,000	5,210,000	*5,162,000	14,155,000	17,656,000
February	8,588,000	8,255,000	5,933,000	6,015,000	16,815,000	*19,689,000
March	10,370,000	11,034,000	8,995,000	10,279,000	18,189,000	20,444,000
First quarter	27,746,000	28,145,000	20,138,000	21,456,000	....	....
April	11,726,000	....	12,771,000	....	17,159,000	....
May	13,777,000	....	14,551,000	....	16,403,000	....
June	13,538,000	....	15,036,000	....	14,903,000	....
Second quarter	39,041,000	....	42,358,000	....	....	....
July	14,029,000	....	16,614,000	....	12,319,000	....
August	15,128,000	....	16,855,000	....	10,666,000	....
September	14,519,000	....	16,827,000	....	8,404,000	....
Third quarter	43,676,000	....	50,296,000	....	....	....
October	14,820,000	....	17,160,000	....	6,073,000	....
November	13,141,000	....	10,289,000	....	8,928,000	....
December	10,435,000	....	5,506,000	....	13,913,000	....
Fourth quarter	38,396,000	....	32,955,000	....	....	....
145,747,000	....	....	....		148,859,000	....

*Revised.

The exports of hydraulic cement in February, 1925, were 56,249 bbl., valued at $181,356, of which there were sent to South America, 19,288 bbl.; Cuba, 13,147 bbl.; to the other West Indies, 878 bbl.; Mexico, 11,643 bbl.; Central America, 7,513 bbl.; Canada, 406 bbl.; and to other countries, 3,374 bbl. These exports are exclusive of shipments to the following possessions: Porto Rico, 6,402 bbl.; Hawaii, 770 bbl.; Alaska, 69 bbl.

The statistics of imports and exports of hydraulic cement in March, 1925, are not available.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1924 AND 1925, IN BARRELS*

Months	Imports 1924	Imports 1925	Exports 1924	Exports 1925
January	153,839	229,838	88,586	71,596
February	162,930	119,077	62,606	56,249
March	160,517	(†)	91,224	(†)
April	148,137	....	83,200	....
May	161,304	....	88,850	....
June	196,655	....	74,064	....
July	108,944	....	60,139	....
August	192,634	....	85,883	....
September	138,369	....	69,470	....
October	214,987	....	79,180	....
November	198,806	....	42,490	....
December	173,814	....	52,851	....
	2,010,936	....	878,543	....

*Compiled from records of the Bureau of Foreign and Domestic Commerce and subject to revision. †Imports and exports in March, 1925, not available.

ESTIMATES OF PRODUCTION, SHIPMENTS, VALUE, AND STOCKS OF FINISHED PORTLAND CEMENT IN 1924, BY STATES
(Subject to revision.)

State	Active plants	Production— Barrels	Shipments— Barrels	Shipments— Value	Stocks Dec. 31. Barrels
Alabama	5	5,541,000	5,543,000	$9,091,000	146,000
California	10	11,615,000	11,502,000	25,649,000	470,000
Illinois	4	7,005,000	6,956,000	12,243,000	691,000
Iowa	5	5,624,000	4,882,000	8,983,000	1,695,000
Kansas	7	5,894,000	5,817,000	10,122,000	867,000
Michigan	15	9,162,000	8,993,000	16,367,000	966,000
Missouri	5	7,900,000	7,710,000	13,801,000	921,000
New York	9	7,547,000	7,450,000	13,708,000	783,000
Ohio	7	4,599,000	4,298,000	7,865,000	657,000
Pennsylvania	22	40,468,000	39,847,000	69,993,000	2,705,000
Texas	5	4,566,000	4,488,000	8,482,000	356,000
Washington	4	1,845,000	1,793,000	4,339,000	290,000
Other states*	34	37,093,000	36,468,000	66,676,000	3,366,000
	132	148,859,000	145,747,000	267,319,000	13,913,000

*Including Colorado, Georgia, Indiana, Kentucky, Maryland, Minnesota, Montana, Nebraska, New Jersey, Oklahoma, Oregon, South Dakota, Tennessee, Utah, Virginia, West Virginia and Wisconsin.

ESTIMATES OF PRODUCTION, SHIPMENTS, VALUE, AND STOCKS OF FINISHED PORTLAND CEMENT IN 1924, BY DISTRICTS
(Subject to revision.)

Commercial district	Active plants	Production— Barrels	Shipments— Barrels	Shipments— Value	Stocks Dec. 31. Barrels
Eastern Penn., New Jersey and Maryland	22	38,281,000	37,630,000	$65,809,000	2,488,000
New York	9	7,547,000	7,450,000	13,708,000	783,000
Ohio, Western Penn. and West Virginia	12	14,322,000	14,030,000	25,535,000	1,370,000
Michigan	15	9,162,000	8,993,000	16,367,000	966,000
Wisconsin,† Illinois, Indiana and Kentucky	11	21,856,000	21,355,000	38,012,000	2,040,000
Virginia, Tennessee, Alabama and Georgia	12	11,347,000	11,375,000	19,224,000	469,000
Eastern Missouri, Iowa, Minn. and S. Dak.‡	11	14,851,000	13,982,000	25,307,000	2,737,000
Western Missouri, Nebraska, Kan. and Okla.	11	9,912,000	9,595,000	16,887,000	1,482,000
Texas	5	4,566,000	4,488,000	8,482,000	356,000
Colorado and Utah	5	2,425,000	2,378,000	5,065,000	316,000
California	10	11,615,000	11,502,000	25,649,000	470,000
Oregon, Washington and Montana	9	2,975,000	2,969,000	7,274,000	436,000
	132	148,859,000	145,747,000	267,319,000	13,913,000

†Began producing and shipping June, 1924. ‡Began producing December, 1924.

MASONRY, NATURAL, AND PUZZOLAN CEMENT SHIPPED, 1923 AND 1924

State	1923 Producing plants	1923 Barrels	1923 Value	1924 Producing plants	1924 Barrels	1924 Value
Alabama*	1			1		
Illinois	1	684,563	$1,137,585	1	745,369	$1,147,088
Indiana	1			1		
Kansas	1			1		
Kentucky	1			1		
Minnesota	2	587,111	809,767	2	673,092	859,471
New York	1			1		
Ohio	1			1		
Pennsylvania	1			1		
	10	1,271,674	$1,947,352	10	1,418,461	$2,006,559

*Puzzolan only.

New Company to Build Cement Plant at Tulsa, Oklahoma

CONSTRUCTION of the proposed cement plant near Dawson, within the yard limits of Tulsa, Okla., will begin in the next 60 or 90 days, according to an announcement in the *Tulsa (Okla.) Herald.* The articles of incorporation of the company have been filed at Dover, Del. Under the charter the company is permitted to issue $1,000,000 worth of preferred and 100,000 shares of common stock.

The plant will cost about $1,500,000. Its daily capacity will be 2500 bbl. of manufactured cement a day. The rock acreage of the company is about eight miles northeast of Tulsa near Bird Creek. The plant itself will be located near Dawson within the yards limits of Tulsa. The crushed rock will be hauled by rail to the plant where there is sufficient shale and coal to complete the process of manufacturing the cement. The crusher will be near the Mohawk park line of the Oklahoma Union Railroad company. Steps will be taken to push it to completion by the time the plant is ready for operation.

Named as incorporators are A. L. Farmer, Cyrus H. Sweet, C. H. Terwilleger, Arthur H. Craver, T. J. Hartman, A. E. Bradshaw, H. L. Standeven, O. K. Eysenbach, R. Otis McClintock, I. F. Crow and C. A. Mayo.

Atlas Portland Cement Company to Operate Gypsum Plant in Oklahoma

MACHINERY and equipment are being installed in the new gypsum plant of the Atlas Portland Cement Co., north of Watonga, Okla., according to a news dispatch in the *Oklahoma (Okla.) Oklahoman.* The plant is scheduled to start operation around the middle of April and will ship gypsum to the various cement plants of the company throughout the country.

Selling State-Made Cement in South Dakota

PAUL BELLAMY, manager of the state cement plant at Rapid City, S. D., has wired heads of various companies and written dealers, offering 50,000 bbl. of cement for immediate acceptance at 20 cents below the current schedule for cash, or 10 cents below on 30 days and net 60 days.—*Sioux Falls Argus-Leader.*

Southwestern Portland Cement Company to Build Gypsum Plant in New Mexico

THE Southwestern Portland Cement Co., of El Paso, Texas has leased 2560 acres of gypsum deposits west of Alamogordo, N. M., according to the *Albuquerque, (N. M.) Tribune.* The gypsum is said to be 97% pure and will be manufactured into various gypsum products.

C. Leonardt, president of the company, will be in Alamogordo in the near future to plan the development of the plant. He is now in Osborn, Ohio, where the company has just completed the construction of its new $2,500,000 cement plant.

Among the officials of the company who were at Alamogordo on the project were C. E. Nichols, general superintendent, H. C. Swearingen, general sales manager and W. F. McKenzie, chief chemist.

New Cement Plant at Glendale, California, Rumored

IT is rumored in Los Angeles, Calif., papers that W. H. Houghton, associated with Pat Caughlin and W. E. Cozart, have formed a new $10,000,000 company under the laws of Delaware and purchased 1280 acres of clay, limestone and gypsum deposits from the Boulder Lime and Cement Co. of Las Vegas, Nev. These deposits are located near Glendale, Calif., and the company proposes to erect a portland cement plant on the site to cost about $2,000,000.

More Investigation of South Dakota Cement Plant in Sight

CALLING the attention of Secretary Paul Bellamy, of the state cement commission, to his failure to report the receipts of the cement plant as provided by law, E. A. Jones, state auditor, has asked Mr. Bellamy why the receipts from sales are not being reported to the auditor and turned into the state treasury, it became known today.

The law governing the cement plant management specifies the cement plant receipts shall be turned over to the state treasurer for the state cement fund, and an itemized statement of receipts made monthly or oftener to the auditors, and that disbursements shall be made by the auditor from this fund. The only credit to the cement plant since the first of the year, Jones says, is $76,000 appropriations by the legislature, despite the fact that the plant has been in operation more than two months and the first sales were reported almost that long ago.—*Sioux City (Iowa) Journal.*

If the above provisions of the law are carried out it may be possible for the citizens of South Dakota to check up the alleged earnings of their state cement enterprise occasionally.

A Tremendous Mineral Aggregate Industry Around Philadelphia

Nothing Slow About Pennsylvania City So Far as Construction and the Use of Rock Products Is Concerned

By Edmund Shaw
Editor, Rock Products

IT seems to be the general opinion that the district which includes Philadelphia, Wilmington and Baltimore will require a large amount of crushed stone and sand and gravel this year. I have talked with Charles Warner, president of the Charles Warner Co., and the American Lime & Stone Co., Robt. MacBurney of the Birdsboro Stone Co., Richard A. Froehlinger, treasurer of the Arundel Corp., and other large producers and they were not only of this opinion but were willing to be quoted as saying so in ROCK PRODUCTS. Mr. MacBurney noted that orders for the usual commercial sizes of crushed stone were coming in freely and in addition there were more sales of ballast to the railways than there were at this time last year. The railroads all over the country have been somewhat cautious in buying ballast in the past two or three years, but it looks as though they would purchase it more liberally this season.

A 45-Ton Blast

A big shot—a really big shot which required 45 tons of explosive to load—was fired at the Birdsboro quarry recently. The amount of rock brought down has not been calculated exactly, but it is well over a half-million tons. The plant has been added to since the description was published in ROCK PRODUCTS in the issue of October 4, 1924. It will be remembered that the crushing equipment consisted of a very large jaw crusher followed by four 16-in. gyratory crushers with individual motors. Two Morgan crushers of the direct driven type have been installed between these pairs of gyratories and are being used to crush ballast size rock to finer sizes. Before these were installed it was necessary to rehandle the larger sizes of stone in order to recrush them and the installation of these crushers avoids this extra work. The demand in the crushed stone business, in the eastern states, at least, seems constantly to move toward the smaller sizes, whatever the reasons for this may be. It has been more than once called to the writer's attention in visiting plants.

Penn plant of the Charles Warner Co., Tullytown, Penn.

New gravel storage installed recently at the Penn plant

The shot referred to above was the first in this quarry with 8-in. holes and it was so successful that 8-in. holes (instead of usual 6-in.) will be used hereafter. They cost not much more to drill and will "pull" a considerably greater depth of rock than 6-in. holes. They were loaded with 75% explosive and as the shot was somewhat experimental, 12% more explosive was used than was calculated to be necessary. This will not be done again, for it is apparent that so much explosive is not needed. It was well, however, to "play safe" where the rock was so hard and so much had been spent in drilling.

It will be remembered perhaps by readers of this article in the October issue that a number of these holes were put down by contract with drills that use steel shot for cutting. These, as was prophesied at the time, did not prove as economical as well drills, although Mr. MacBurney is of the opinion that they might have been more successful if they had been more heavily built and if they had been given more power; in other words, if they had been better adapted to the exceeding hard trap rock which the Birdsboro quarry contains.

Remarkable Growth of Philadelphia

Charles Warner, whose company markets a large share of its products in Philadelphia and Wilmington, called attention to the present rapid growth of these cities, especially Philadelphia. One has only to use his eyes to see that this is true, for the city has taken on a far different character from that

The 2 1/2-yd. bucket on dredge at Penn plant

it had a quarter of a century ago when it was a favorite subject for the somewhat labored humor of the New York newspapers on account of its slowness. It is going through the process that most progressive American cities are going through, that of being modernized by tearing down old buildings and putting up newer and larger and more convenient structures. Only Philadelphia is doing it more rapidly than some other cities. There are even iconoclasts who are talking of tearing down the famous city hall, once not only the pride of the city but considered one of the best examples of municipal architecture in the country. But its position, crossing both main arteries of traffic, renders it an obstruction; and its great weight, for it is of solid stone, renders it a menace to the subways already built and projected.

Concrete and Yet More Concrete

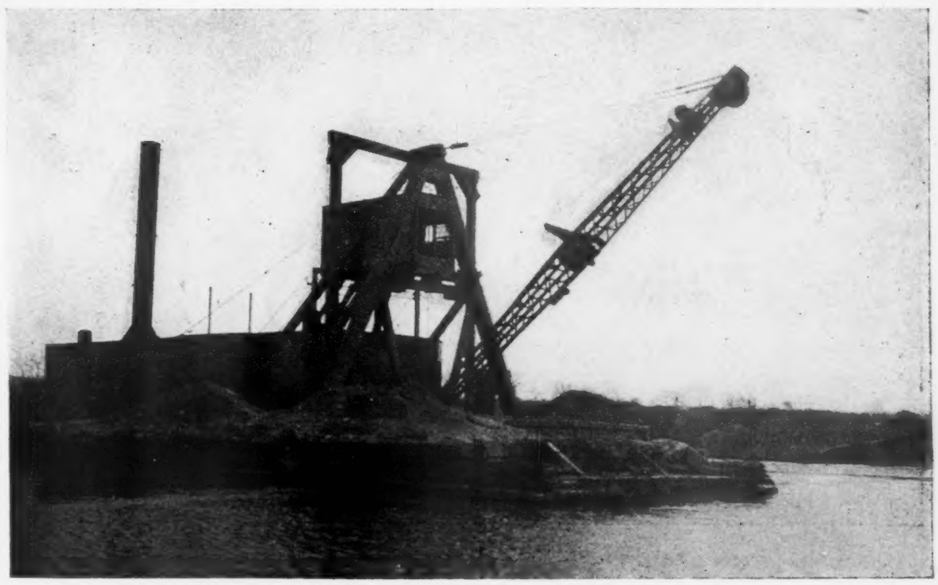
The point that interests Rock Products readers is that all this construction means concrete and yet more concrete. And not all of it is going into the larger structures. The products business is booming, and the use of concrete blocks is by no means confined to small residences. Houses costing $40,000 to $50,000 are being built of concrete blocks in the suburbs of Philadelphia and a number of such residences will be built this season. To show how the products business has grown, one plant, that of the Ellis Concrete Products Co., near Bridgeport, Penn., is producing 15,000 blocks every 24 hours. The plant runs day and night and the demand for blocks is so great that they are taken from the curing kilns and loaded into trucks for delivery while they are still warm and steaming. A lot of cement and aggregate (mostly slag and sand) must be consumed in the manufacture of these blocks.

Tullytown a Sand and Gravel City

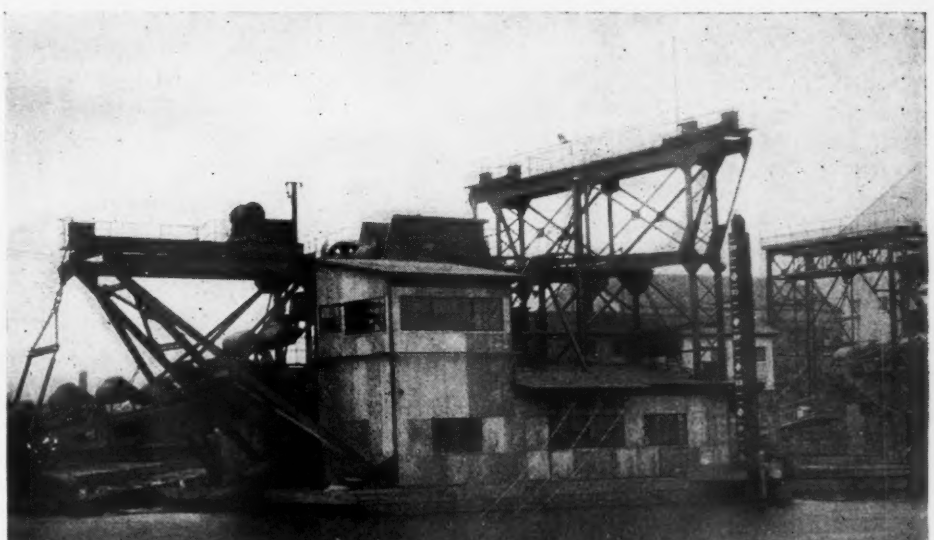
The great aggregate producing center for Philadelphia and other nearby towns and cities is at Tullytown, Penn., about 35 miles from Philadelphia and five miles from Trenton, N. J. This great area which is underlaid with sand and gravel, and much of which is so near the Delaware river that water transportation to market may be employed, was fortunately discovered about the time that the dredges in the Delaware river were giving up because the deposits in the river bed were exhausted. It has proven a godsend not only to the cities for buildings and bridges but to the country around, since so much of the material for highways has come from it. Both gravel and sand are of excellent quality and the amount developed will last through this generation at least, at the present rate of exhaustion. One engineer who is familiar with the territory estimates a life of 35 years at the present rate of working.

The Van Sciver Corp. has two large plants there, one formerly known as the De Frain plant and the other as the Curtis and Hill plant. The Charles Warner Co. also has two, the newly built Manor plant and the Penn plant, which the Charles Warner Co. acquired last year. The Penn plant is being electrified and has had many improvements and additions in the last two or three years. One of these is a storage plant consisting of a long conveyor arranged with a tripper to build stockpiles. This was put in last year.

Like all the others in this territory, the Penn plant is a dredging operation, but is the only one the writer saw in which a clamshell bucket dredge is used. This bucket



Derrick dredge used to excavate gravel at Penn plant

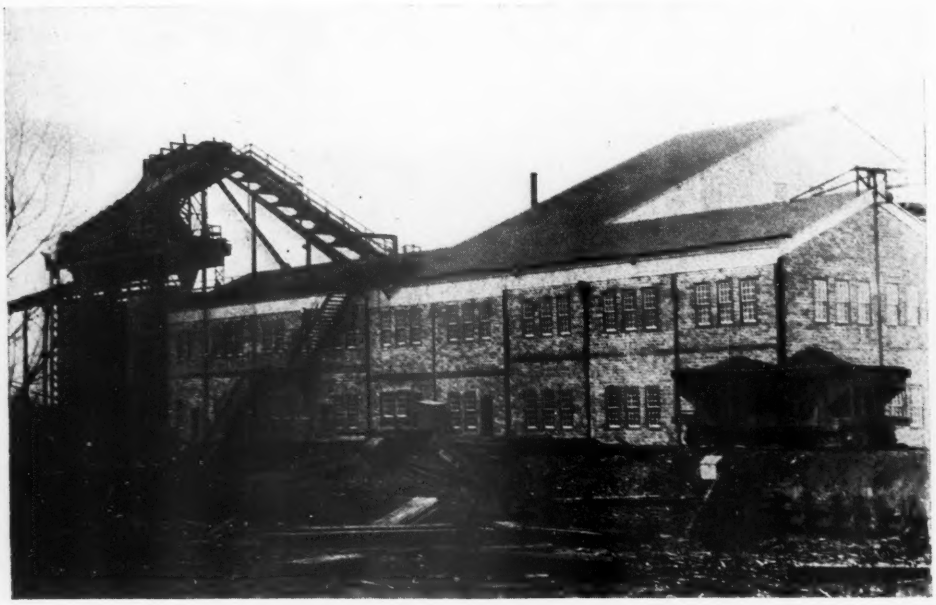


Dredge "John W. Betelle" at the Manor plant of the Charles Warner Co., Tullytown

was designed and built by the Hayward Co. of New York. The dredge is steam driven and has a 2½-yd. clamshell by which the material is dug and loaded on to barges to be conveyed to the washing plant. It is interesting to note that the clamshell type of bucket—with teeth—has been found the most successful type of excavator for this deposit. The orange-peel type, supposed to be the most efficient in hard digging, could not equal the clamshell either in yards per unit of power or per unit of time.

The deposit is said to be too hard for a suction dredge, but one would be interested to see this tried out with a modern suction dredge fitted with a heavy rotary cutter, such as has proven itself successful in other hard digging.

The Manor plant is to be described in a forthcoming issue of ROCK PRODUCTS, so it will not do to anticipate that description here. The illustration is enough to show that it is a long way in advance of the usual type of sand and gravel plant. It more resembles a big factory. And it is a factory, for washed and screened sand and gravel is now conceded to be a manufactured product, having its raw material, its unavoidable waste and its prepared product which must meet pretty definite specifications before it can be placed on the market.



Manor sand and gravel plant of the Charles Warner Co. at Tullytown, Penn. —Probably the finest "sand and gravel factory building" in the world

Day and Night Operation

The Manor plant is one of the very few sand and gravel plants in the country that runs day and night and every working day in the year. Therein lies the answer to the first question that comes to the sand and gravel man's mind when he notes the splendid steel and concrete construction and especially the fine building that houses the washing and screening plant. This question is: Can such a heavy investment pay? It pays because it permits continuous operation. The substantial installation of machinery and equipment is a guarantee against lost time from making changes and repairs. The well lighted and well heated building that houses the washing and screening equipment permits the work to go on in cold weather as in warmer weather. Practice in the sand and gravel business is now so settled that it is possible to design a plant for continuous operation and also to design a plant that will not need to be changed in a few years because methods have changed.

Investment Justified

When the time comes to write off the cost of such a plant on a per ton basis, it will be found that the cost per ton for plant investment will be less than for the ordinary plant for which the depreciation has to be placed at a high figure in order for the business to "come out square." In one whole district this depreciation figure has been placed at 28% per year. With a deposit and a market sufficient to guarantee a long life it would seem that more substantial construction than usual is not only justified but that it is the soundest economy.

Source of Long Island Gravel Deposits

MASSACHUSETTS and the rest of New England—indeed, all of the northern part of North America—may at some time be buried underneath a vast sheet of ice ranging in thickness from a thousand to several thousand feet. Unlikely as such an event may seem, that is exactly what occurred not only once but several times during the Great Ice Age, or glacial epoch.

The time that has elapsed since the last ice sheet disappeared has been variously estimated by scientists as 10,000 to 30,000 years. This seems to be a long time, but it is only a fraction of that which appears to have elapsed between some of the ice advances, for the great glacier melted back at intervals; so who knows that New England may not again be invaded and overwhelmed by an ice sheet such as now covers all of Greenland except its narrow marginal parts? No one, however, need worry or order a reserve supply of coal on account of this possibility, but we may note with interest some of the evidences in this region of the great ice invasion, for the spoor of a glacier is quite as characteristic as the footprints of a man or the tracks of a wild beast.

During the Great Ice Ages more snow fell in winter than was melted in summer, and in consequence the snow piled up to great depths and was gradually compacted to masses of ice hundreds or thousands of feet thick. The ice that thus accumulated in enormous quantities spread out under its own great weight and overwhelmed an immense region. One of the centers of ice accumulation lay east of Hudson Bay, and from this center a vast glacier advanced slowly southward.

The ice was so thick that it overrode even the highest mountain peaks of New England and subjected them to its scouring action. As the glacier moved over the land it took up and embedded in its bottom boulders, pebbles, grains of sand and clay, which made it a great flexible rasp or planing machine that wore away many of the minor irregularities of the surface, smoothed and polished the rock ledges, and marked its trail by grooves and scratches. Many of the pebbles and boulders were themselves also scratched.

Much of the rock debris, called drift, lodged under the slowly moving ice, where it formed sheets of the stony clay which makes up many of the hills in that region and which nearly everywhere covers the bedrock on the slopes and uplands. A great deal of drift and many granite boulders were carried southward to the edge of the ice sheet and there dropped as the ice melted. The drift thus piled up formed terminal moraines, which now extend as ranges of hills eastward the whole length of Long Island, which appear also on the islands to the east as far as Nantasket, and which form the main arm of Cape Cod.

A detailed description of these interesting phenomena in a part of Massachusetts has just been issued by the Geological Survey, Department of the Interior, as Bulletin 760-B, a well-illustrated paper entitled "The physical features of Central Massachusetts," by W. C. Alden. In the preparation of this paper an effort has been made to present the scientific material in such form as will make it usable and interesting not only to teachers and students of geography but to general readers. The bulletin will be furnished by the Geological Survey, Washington, D. C., so long as the free edition lasts, after which it may be obtained from the Superintendent of Documents at 50 cents a copy.

J. L. Shiely's Great Northern Ballast Plants

HEREWITH are the three views of the new ballast plant for the Great Northern Ry. at Chinook, Mont., "as was" March 18. Readers of ROCK PRODUCTS will recall that this is one of the several similar plants being built by the Great Northern Ry. under the supervision of the J. L. Shiely Co., St. Paul, Minn., which company will also operate the plants under contract.

These plants are chiefly interesting to commercial producers as an example of how the railway ballast problem was solved by a well-managed railway without going into the sand and gravel business in competition with commercial producers. Through its contract with the J. L. Shiely Co., one of the largest producers of sand, gravel and crushed stone in the Northwest, the railway company is assured of the most efficient management possible, and consequently is protected in the matter of price. But, in addition the railway company will profit by hauling any commercial business the plants may get and will profit directly from such commercial business as the owner of the plants.

Some features of this contract will be found in ROCK PRODUCTS, January 24 issue and a description of the new plants in the March 21 issue.

Chinook, Mont., ballast plant of the Great Northern Ry., built and to be operated by the J. L. Shiely Co., St. Paul, Minn.

Marshall County, Iowa, Bids on Crushed Stone

THE board of supervisors of Marshall county, Iowa, awarded a contract for 2500 tons of crushed rock, for use in the construction of the Lincoln highway, to the Northwestern Gravel Co., of Des Moines at a price of $1.25 per ton. The company secured the bid because its bid plus freightage was lower than those of other companies submitting bids, the Northwestern company's quarry at LeGrand being located advantageously. Other bids according to the *State Center (Iowa) Enterprise* were: Linwood Cement Co., Davenport, $1 per ton, $2.36 per ton delivered at State Center; River Products Co., Iowa City, $1.10 per ton f. o. b. Coralville; Ideal Sand and Gravel Co., Inc., Mason City, $1.25 per ton, f. o. b., Mason City.

Acme Cement Receiver Asked

CHARLES H. BREERWOOD of Philadelphia has filed receivership proceedings in Court of Chancery against Acme Cement Corporation of Catskill, N. Y. Mr. Breerwood, who was formerly president of the concern, alleges that the corporation is being operated and managed in the sole interests of those charged with its management and that he is advised and believes the directors and officers of the company are attempting to negotiate sale of the property and assets at price far below their value.

The Acme Cement Corporation was incorporated in Delaware in October, 1919, with capital of 13,500 shares of no par stock which was later increased to 16,000 shares. —*New York Wall Street News.*

Claims Acme Finances Good

CHARLES G. WATT, president of the Acme Cement Corporation, representing the Lancaster (Penn.) stockholders, has issued the following statement with reference to an injunction procured in Wilmington against the company by a former official.

"The action," said Mr. Watt, "which has recently been filed against the Acme Cement Corporation, is a controversy affecting only the rights of stockholders. This action was brought by Mr. C. H. Breerwood, a former official and employe of the company.

The financial condition of the company, it is stated by Mr. Watt, is the best in the history of the organization.—*Lancaster (Penn.) Intelligencer.*

Another view of the Great Northern Ry. sand and gravel plant at Chinook, Mont.

Plant on March 18 showing construction work done mostly during the winter season

Sand, Gravel and Rock Now Sold by Weight

HEREAFTER the Los Angeles and Hollywood, Calif., builders who annually consume thousands of tons of sand, gravel and crushed rock hauled by train and motor truck from more than 30 rock crushing plants in San Fernando valley, will buy the material by the ton instead of by the yard. Practically all of the gravel concerns in the valley will go on the weight basis.—*Los Angeles Examiner.*

Financial News and Comment

Par Value of Santa Cruz Cement Reduced

THE Santa Cruz Portland Cement Co., San Francisco, Calif., has changed its authorized capital stock from 50,000 shares, par $100 to 100,000 shares, par $50. The stockholders will receive two shares of $50 stock for each share par $100 now owned.

International Cement Company Earnings in 1924

REPORT of International Cement Corp. for quarter ended December 31, 1924, shows net income of $1,005,777 after charges and federal taxes, equivalent after preferred dividends, to $2.36 a share earned on 400,000 shares of no par common stock outstanding at end of year. This compares with $921,426 or $2.26 on 364,167 shares in preceding quarter and $570,034 or $1.50 a share in same quarter of 1923.

Net income for year 1924, as compiled from quarterly reports, was $3,047,506 after charges and federal taxes, equivalent after preferred dividends to $7.14 a share on common stock, as compared with $2,422,577 or $6.37 a share on 364,167 shares in 1923.

Income account for quarter ended December 31, 1924, compares as follows:

	1924	1923
Sales	$4,296,187	$2,753,178
Expenses, depreciation, etc.	3,412,159	2,050,318
Manufacturing profit	$ 884,028	$ 702,860
Other income	228,364	158,883
Total income	$1,112,392	$ 861,743
Federal taxes, etc.	106,615	291,709
Net income	$1,005,777	$ 570,034

Income account for 1924, compiled for company's quarterly reports compares as follows:

COMPILATION OF THE QUARTERLY REPORTS OF THE INTERNATIONAL CEMENT CORP.

	*1924	1923	1922	1921
Sales	$16,700,132	$11,289,116	$9,407,725	$9,172,311
Expenses, depreciation, etc.	13,219,773	8,418,948	7,714,096	7,156,391
Net profit	$ 3,480,359	$ 2,870,168	$1,693,629	$2,015,920
Other income	285,637	102,262	168,451	255,206
Total income	$ 3,765,996	$ 2,972,430	$1,862,080	$2,271,126
Federal taxes, etc.	718,490	549,853	437,033	741,226
Net income	$ 3,047,506	$ 2,422,577	$1,425,047	$1,529,900

*Compiled from quarterly reports and subject to adjustments.

International Cement's Steady Expansion

THE QUESTION below was recently asked *Barrow's Financial Weekly* and was answered by the editor of that paper.

What is your opinion of International Cement as a stock to be added to my present list which I intend to hold for at least two or three years? What is the outlook for the company?

Answer—There is only one element in the International Cement situation that detracts from the stock and that is the comparative youth of the company, which was organized in 1919. In its four years of corporate existence International Cement Corp. has made remarkable strides, sharing its prosperity with stockholders and at the same time strengthening its treasury status and enlarging its physical capacity.

In 1921 the company issued preferred stock to the amount of $1,588,000 and bonds amounting to $1,500,000. Early in 1923 remaining bonds outstanding to the amount of $1,300,000 were called for redemption. During 1924 the company issued $2,000,000 7% preferred stock to provide for paying off indebtedness of Norfolk, Va., plant and providing funds for general improvements. Present capital structure is made up of $3,468,700 7% cumulative preferred and 400,000 shares of no-par value common.

The company earned $5.24 per common share in the first nine months of 1924, comparing with $6.27 in 1923, $4.06 in 1922, $5.12 in 1921 and $6.95 in 1920. Dividend rate on the common stock has been increased following earnings and is now $4 per annum. Recently a 10% stock dividend was declared.

In 1919, at the time of organization, capacity was 2,200,000 barrels per annum and since then it has been increased threefold and by the middle of this year capacity is expected to reach 7,000,000 barrels per annum.

Property account valued at $8,773,084 on December 31, 1919, was carried at only $12,660,823 at the end of 1923, a somewhat conservative figure in view of the expansion that has taken place in the interim. Cash has been trebled since 1919; notes and accounts payable have been halved and working capital has been tripled.

RECENT QUOTATIONS ON STOCK IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co.	Apr. 13	100	100	110	
Arundel Corporation (sand and gravel—new stock)	Apr. 9	No par	22¼	23½	
Arundel Corporation	Feb. 11	50	112	113½	
Atlas Portland Cement Co.	Apr. 13	100	131	136	
Boston Sand & Gravel Co.	Mar. 27	100	63½	63½	
Canada Cement Co., Ltd.	Apr. 15	100	103	103¾	1½% quar. Apr. 16
Charles Warner Co. (lime, crushed stone, sand and gravel)	Apr. 13	No par	20	22½	50c Apr. 10
Charles Warner Co. (preferred)	Apr. 13	100	100	102	1¾% Apr. 23
Giant Portland Cement Co.	Apr. 9	50	23⅛	25⅛	
Giant Portland Cement Co. (preferred)	......	50	50	50¼	
Ideal Cement Co.	Apr. 15	No par	55	65	75c Mar. 31
Ideal Cement Co. (preferred)	Mar. 16	100	......	......	1¾% quar. Mar. 31
International Cement Co. (common)	Apr. 15	No par	59½	59⅞	$1 Mar. 31
International Cement Co. (preferred)	......	100	......	......	1¾% quar. Mar. 31
International Portland Cement Co. (preferred)	Mar. 1	......	30	45	
Kelley Island Lime & Transport Co.	Dec. 31, 1924	100	102	104	2% quar.
Lehigh Portland Cement Co.	Feb. 13	......	67	69	1½% quar. Apr. 1
Michigan Limestone and Chemical Co. (preferred)	Apr. 11	100	......	......	1¾% quar. Apr. 15
Missouri Portland Cement Co.	Apr. 15	25	48	48	
Pacific Portland Cement Co., Consolidated	Apr. 11	......	82	......	
Pittsfield Lime and Stone Co. (preferred)	......	100	......	......	2% quar. Apr. 1
Rockland and Rockport Lime Corp. (1st preferred)	Apr. 13	100	98	......	3½% semi-annual
Rockland and Rockport Lime Corp. (2nd preferred)	Apr. 13	100	67	......	3% semi-annual
Rockland and Rockport Lime Corp. (common)	Apr. 13	No par	57	......	1½% quar. May 1
Sandusky Cement Co. (common)	......	......	......	......	2% quar. Apr. 1, 100% payable in com. stook, Apr. 1
Santa Cruz Portland Cement Co. (bonds)	Apr. 11	100	103	......	6% bonds
Santa Cruz Portland Cement Co. (common)	Mar. 28	50	......	60	$1 Apr. 1
Superior Portland Cement Co.	Mar. 1	100	......	120	
United States Gypsum Co. (common)	Apr. 15	No par	145	145½	40c quar. Mar. 30
United States Gypsum Co. (preferred)	Apr. 11	100	114	116	1¾% quar. Mar. 30
Wolverine Cement Co.	Apr. 15	......	12	12	2% May 15

Editorial Comment

Frankness With the Public

Our new department of financial news and stock quotations in the rock products industry is meeting with a varied reception—as indeed we expected it to. To a very large extent producing organizations in our industries are closed corporations, whose stock is tightly held by individuals or very small groups of business associates. In many ways this is an ideal form of business organization, assuring as it does complete freedom in every way. It is not, however, without its drawbacks, for there is always the very human tendency toward self-sufficiency, and a tendency to completely ignore public opinion, which in the last analysis, in the form of "good will," figures up the biggest asset a business or an industry can have. A good example of this is the recent sale and refinancing of the Dodge Bros. automobile company.

We find this opinion expressed by some of the best minds directing the rock products industries. For example, with his permission, we quote from a letter by H. Struckmann, president and general manager of the International Cement Corporation, New York City:

"In our opinion the program you have outlined in your letter is a very constructive one, and we wish that all cement manufacturers would publish their financial reports instead of holding them back from the public. We believe that the lack of information of the above character and the failure to disseminate other data of public interest constitute the principal causes of whatever adverse criticism industry has been subjected to in the past.

"Our management is wholly committed to the policy of securing public confidence above all other things, freely and frankly furnishing facts about our operating and business methods and relying upon an informed public for fair treatment in return.

"From the foregoing you will understand that we are ready not only to co-operate with you in your new activity but go much further in giving the public complete information about the International Cement Corporation and its subsidiaries."

There is really no reason why the policy of a closed corporation should differ from that of one whose stock may be publicly owned and traded in. That policy, in the final analysis, is based on the assumption that the *public in general,* and not merely the stock-trading public, has an interest in every business enterprise. And it is an undeniable fact because *all* industrial organizations exist by sufferance of the general public, which can, and may at some time, make the existence of industrial corporations impossible.

Much of the secretiveness of corporation officers comes from a mistaken belief that somehow or other it is a crime for an organization to let it be known that it makes profits. On the contrary it would be an economic crime if it did not make fair profits. A pauper business is much more of a nuisance and a charge on society than a pauper individual.

Publicity in all matters relating to industrial enterprise is one of the reasons why this country is today enjoying industrial peace and prosperity while other parts of the world are convulsed with industrial revolutions. It is in line with the growing appreciation of the fact that successful men—successful in the sense that they are leaders and organizers—are coming more and more to consider themselves trustees for the general public of the funds and power they administer rather than autocrats with a merely selfish desire to exercise that power.

The Coal Situation

Coal production for the first 83 working days of the calendar year 1925 was 132,974,000 tons which is the lowest figure for the same period since 1922. It is about 10,000,000 tons or between 7 and 8% less than production for the same period last year. We see nothing to get excited about in this connection either as concerns future open-top car supply or coal supply. The coal operators are merely reaping the benefits of their hold-up policy of 1921 and 1922. Anyone who has been out and around among the quarries and gravel pits must have observed the great increase in the use of gasoline and electric powered equipment where formerly steam power was used. We can't imagine this condition is peculiar to the rock products industry. It is undoubtedly true of all industries.

The coal business is low because there is not the same demand for coal there used to be. The coal industry in consequence is going through a squeezing out process in which the less efficient operations are being abandoned. It is probably the best thing that can happen to the industry from an economic viewpoint, and the one that such economists as Herbert Hoover has said must come before it could approach a healthful state.

This year, as for the past two years, there is and will be propaganda to buy coal early and avoid congestion. Our suggestion is buy coal to the best advantage because the advantage is still with the buyer and let the lesson learned by the coal industry be your lesson as well. Nothing is really so essential to modern civilization that a substitute may not be found, at least temporarily. Arrogance in dealing with the public, or the intelligent part of the public, always acts as a spur to eliminate those who show such arrogance.

C. L. McKenzie, President, National Slag Association

National Slag Association Holds Annual Meeting

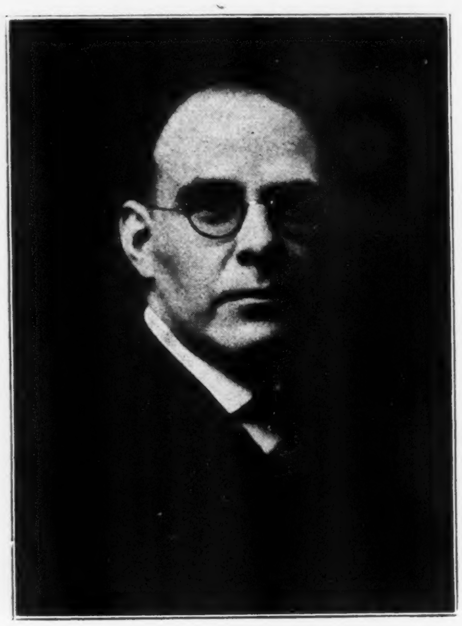
THE eighth annual meeting of the National Slag Association was held at the Hollenden Hotel, Cleveland, Ohio on April 3.

During the business sessions C. L. McKenzie, president of the Duquesne Slag Co., Pittsburgh, Penn., was re-elected president. Mr. McKenzie besides having an intimate knowledge of crushed slag manufacture is well known for his engineering ability demonstrated in several railroad bridges designed and erected by him. C. E. Ireland, vice president and sales manager of the Birmingham Slag Co., Birmingham, Ala., and author of the article on "Successful Merchandising of Crushed Slag" in the November 15, 1924, issue of ROCK PRODUCTS, was re-elected vice president of the association. H. J. Love, 933 Leader-News Bldg., Cleveland, Ohio, was again re-elected secretary and treasurer. Mr. Love has been the secretary of the association since its organization eight years ago.

C. E. Ireland, Vice-President, National Slag Association

Duquesne Slag Company Expands

THE property of the Emanuel Slag Co. with crushers in Catasauqua, Glendon, and South Easton, Penn., has been sold to the Duquesene Slag Co., Pittsburgh. The new company is said to have options on the large slag dumps along the Lehigh Canal between Allentown and South Catasauqua and on the dump in East Catasauqua.—*Philadelphia (Penn.) Public Ledger.*



H. J. Love, Secretary-Treasurer, National Slag Association

Magnesite in 1924

THE Department of the Interior announces through the Geological Survey that statistics compiled by J. M. Hill show that the magnesite material marketed in the United States in 1924 from domestic mines was equivalent to 100,413 short tons of crude magnesite, valued at $789,728, a decrease of 32% in quantity and 28% in value as compared with the quantity marketed in 1923. The State of Washington produced in 1924, 52,876 tons which was more than half the total output for the year. A low value on the crude uncalcined rock is reported by Washington operators. The value of California crude magnesite produced in 1924, which amounted to 47,537 tons, is estimated at $13.67 a ton, but as all the product is sold calcined or dead-burned, the value thus fixed is entirely arbitrary.

There were fewer producers of magnesite in California in 1924 than in 1923, and the industry throughout the State was rather dormant during the summer but revived toward the end of the year.

The industry in Washington was also working on a smaller scale because of the imports of magnesite. Until freight rates or import tariffs, or both, are further adjusted, domestic producers will probably not be warranted in greatly increasing their output.

DATA ON MAGNESITE MARKET SITUATION

	Domestic production	Imports	Total	Proportion of consumption supplied by Domestic	Foreign
1919	156,226	25,321	181,547	86	14
1920	303,767	63,110	366,877	83	17
1921	47,904	65,569	113,473	42	58
1922	55,790	217,861	273,651	26	74
1923	147,250	151,092	298,342	49	51
1924	100,413	129,576	229,989	44	56

New Rock Asphalt Company Will Develop Kentucky Holdings

AT a meeting of the directors of the East Kentucky Rock Asphalt Co., which has been incorporated under the laws of West Virginia, Joe S. Boggs, formerly state highway engineer, was elected president. The company plans to develop its holdings at Soldier, Ky., on the Chesapeake & Ohio R. R., and will build a plant which is planned to have an annual capacity of 75,000 tons, according to the *Lexington (Ky.) Herald.*

The company's property is estimated to contain approximately 8,000,000 tons of rock asphalt. W. C. West, mining engineer, is general manager. The principal offices of the company will be in Lexington, Ky.

End of an Old Natural Cement Plant

THE Mayor and City Council have completed negotiations for the purchase of the plant and warehouses of the Cumberland Hydraulic Cement and Manufacturing Co., Cumberland, Md. It will cost the city $20,000.

The property consists of a large two-story iron clad building, with stone and concrete basement, along the Western Maryland Railway tracks. Under the agreement the city will acquire all rights to trackage, drive-ways, docks and other conveniences and rights affecting the property. The property will be used by the city for storing materials.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

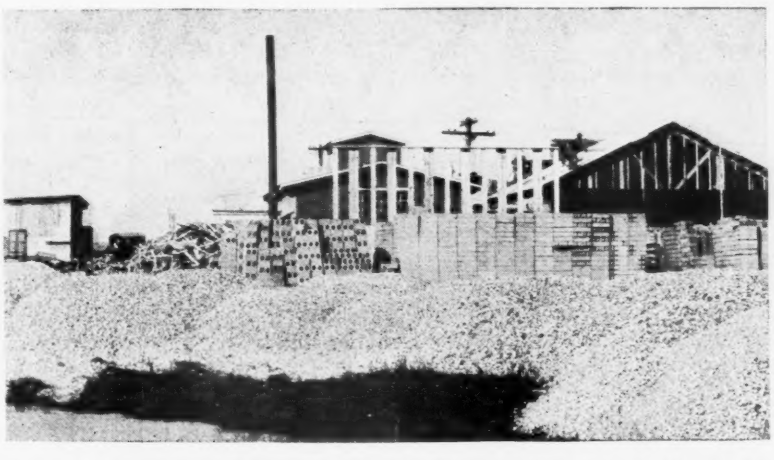
A Plant That Makes Special Building Tile

Rath Construction Products and Cement Company of Indianapolis Makes Building Units for Its Own Work

THE Rath Construction Products and Cement Co. of Indianapolis, Ind., operates a plant that is somewhat unique. Only special shapes of building units are made and practically the entire output is used by the company in the construction of dwellings, apartment houses and warehouses which it erects.

The plant is at 2260 S. Harding street near the sand and gravel plant of the Granite Sand and Gravel Co. from which the aggregate used in the manufacture of these products is obtained. The Granite Company sells a mixed aggregate to a number of block producers, but the Rath company prefers to buy the sand and gravel separately and mix them according to the needs of the unit that is being made. For most tile a mixture of three of sand to one of "grits" is used. "Grits" is the local name for what is often termed fine roofing gravel, the greater part of it being around ⅜-in. in diameter.

The mechanical arrangements at this plant are excellent. The aggregates are received by truck. The truck drives up a concrete incline at the end of the building and discharges its load into a hopper below. From this hopper the aggregate is conveyed to the mixing hoppers.



Concrete products plant of the Rath Construction Co., Indianapolis, Ind., whose products are used for construction work throughout the city

The machines for making the different kinds of tile are set on a track on which a truck runs. This truck can be run on a transfer truck and placed at the entrance of any one of the curing kilns, into which it is pushed from the transfer truck. The same arrangement is used in taking the tile from the kilns to the yard in which the tile are stored and allowed to harden. One of the pictures with this shows the transfer truck with a section of track and near it a truck loaded with the metal pallets which are used in making "Picabb" tile. These can be returned to the plant by the same system of parallel tracks and the transfer truck that are used in handling the block. In fact by this system a truck can be placed at any point that it might be needed either inside or outside of the building.

The kilns are excellently constructed of Picabb tile and have sliding doors at the ends to allow the trucks to pass in or out. The system of heating these kilns, if not unique, is at least not in common use. There is a concrete trough along one side of the kiln which is automatically kept full of water. Under the water is a steam pipe which returns to the boiler. The heat of the steam in the pipe is just enough to keep the water hot enough to steam and evaporate rapidly without boiling. Thus moist air is supplied in sufficient quantity and the kiln is kept at the right temperature for rapid curing. The condensate in the pipes is returned to the boiler. There are several advantages to this system, a very obvious one being that the boiler is fed with condensed water vapor.

The whole plant is far ahead of the usual concrete products plant in the study and attention that have been given to the layout. In other words, it is what may be termed a good job of engineering.

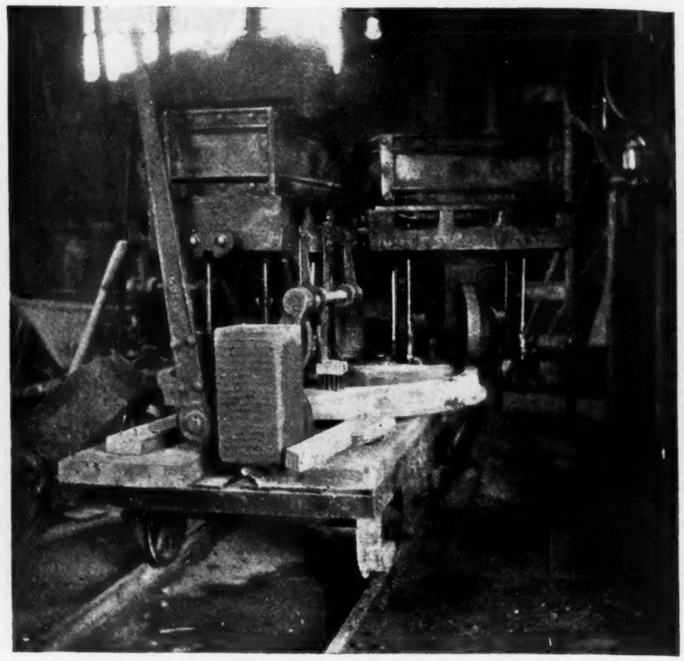
The products of the plant are Duntile, Picabb tile and the flat slabs of the Sawyer system of construction. Duntile is almost too well known to need description, the square block with a cylindrical hole being familiar enough to those acquainted with the concrete products industry. But the other shapes are not so familiar.

The Picabb tile is one that is arranged to give great strength to a wall at the same time that sufficient air space is provided. The photograph shows it with three round holes in the center and the staggered air spaces (segments of circles) on both sides. After the block is laid concrete is slushed into these center holes and this concrete flows down into the horizontal channel below. In this way the wall is held together by a network of little concrete pillars and horizontal members making it very strong and secure against lateral pressure as well as weight.

With this system of construction no lintels are needed above the openings for doors and windows. Reinforcing is put in the horizontal channels above such openings, and this with the concrete in the channels forms a concrete beam that is more than sufficient to carry the weight of the wall and superstructure. Tests which have been made on this construction show that there is a very large factor of safety, although it looks peculiar to see a wall of blocks put up in this way before the stucco is put on the outside. The blocks above the windows look to be hanging in the air.

The same type of tile are made for use in floors but of a different construction. There is a wedge shaped space between these tile that is filled with concrete and

Elevated platform for dumping sand from trucks into hopper below



Tile machines are placed at the ends of industrial railway tracks

forms a concrete beam. Rooms of ordinary size can be constructed in this way without any beams or girders projecting down below the ceiling of the room beneath. For longer spans the tile and the beams between may be built up with concrete to give added strength.

Tile of this sort but with air spaces on only one side are made for use in garages, warehouses and other buildings in which the matter of protection from heat and cold is not so important. Partition tile are made without air spaces but with the central holes through which concrete is poured after laying. These make a very strong bearing partition.

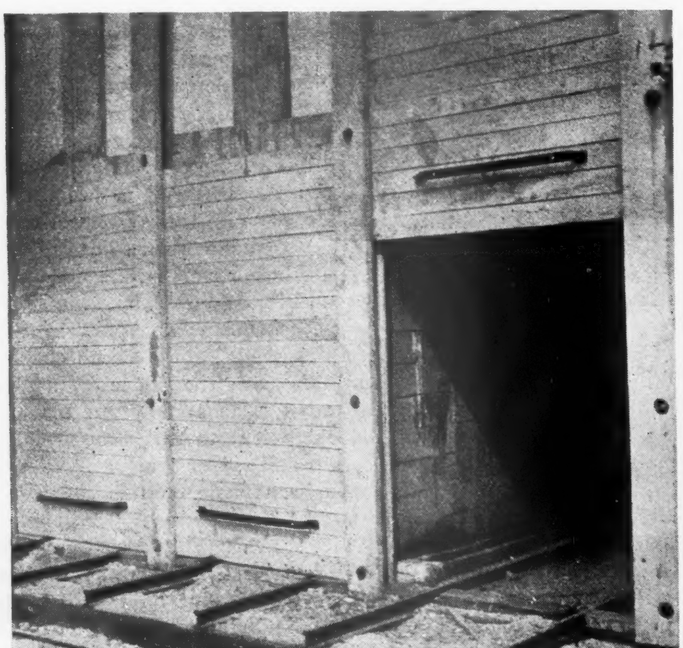
The slabs of the Sawyer system appear like short pieces of inch boards notched at the end. The longer pieces are along the side of the wall both inside and out and the short pieces are set crosswise, between the inside and outside pieces. These short pieces are set about two inches apart and the space between them is filled with concrete as the work of laying them up proceeds. When these spaces are filled they form concrete studding which takes the weight of the roof and superstructure. The wall from inside to outside is about a foot thick.

This system has come from California where so many ingenious methods of concrete construction have originated.

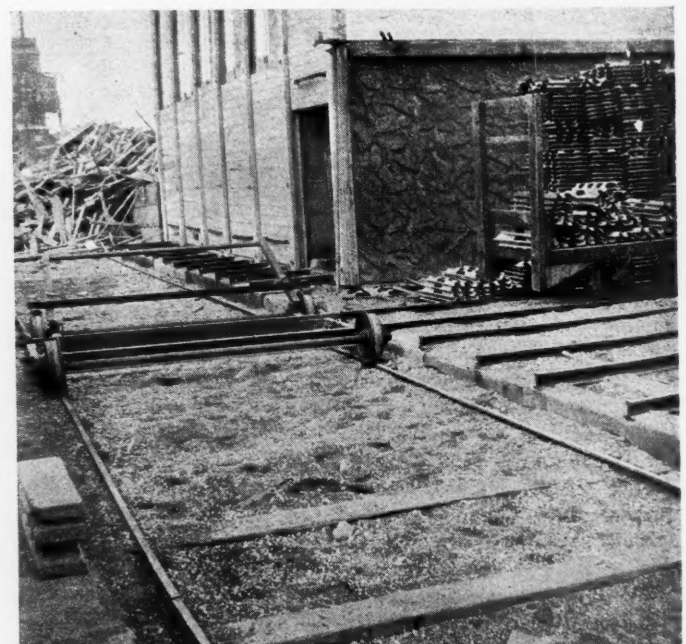
The Rath Construction Products and Cement Co. is a subsidiary of the construction company in which Herman and Emil Rath are the principals.

The office of the company is at 136 North Delaware Street, Indianapolis, Ind.

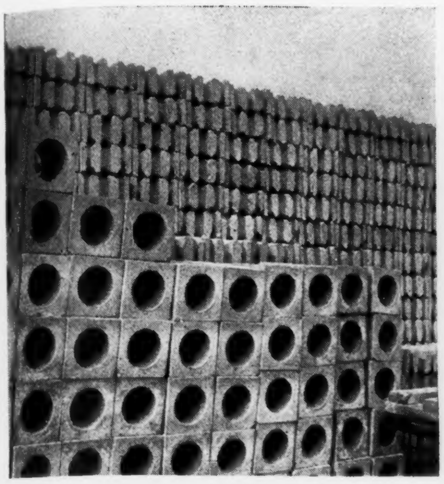
The company is engaged in building a large addition to its plant, the walls being of the Picabb tile described.



Curing kilns—Note the trough containing water at the left inside the doorway



Transfer truck used in shifting products trucks from one track to another



"Duntile" curing in yard

Michigan Farmers Turn to Concrete for Fence Posts

FARMERS are becoming more interested in and using more concrete fence posts yearly, says Prof. H. H. Musselman of the agricultural engineering department of the Michigan Agricultural College in the *Bay City (Mich.) Tribune.*

The increasing cost of cedar posts with the decreasing supply and the increasing realization of the utility and value of cement products are the main causes of the change.

Professor Musselman points out that posts can be made at an average cost, depending on the availability of materials and the nature of concrete used, of about 45 cents per post. Information concerning the making of concrete posts will be furnished by the agricultural department of the college on request.

Union Sand and Gravel Company Subsidiary to Build Cement Products Plant

ERECTION of a plant which will represent a total investment of nearly $200,000, to employ about fifty men, will be begun at once at the foot of Main street, Ceredo, W. Va., by the Union Concrete Pipe Co., recently incorporated for $200,000. The plant will be completed within 60 days.

Announcement of incorporation of the new company and plans for erection of the plant was made by J. L. Richmond, treasurer of the Union Sand and Gravel Co., Huntington, W. Va., in a local paper recently.

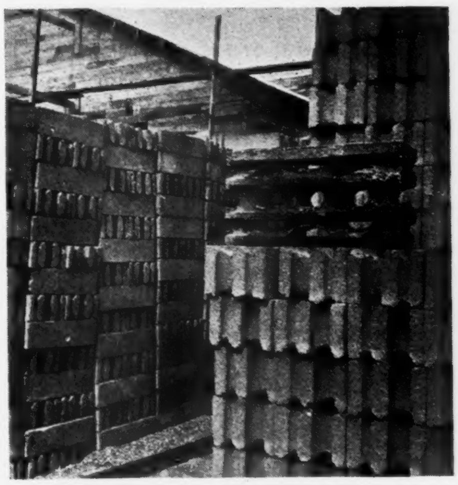
The site of the plant comprises ten acres on the river front and the river and three railroads, the Baltimore & Ohio, the Chesapeake & Ohio and the Norfolk & Western, afford excellent transportation facilities.

Concrete pipe, both plain and of reinforced construction, will be manufactured in size from 6 in. to 7 ft. in diameter.

The Union Concrete Pipe Co., a subsidiary of the Union Sand and Gravel Co., of Huntington, W. Va., and its officers are those of the sand and gravel company: E. P. May, president, H. A. Scholze, vice president, J. L. Richmond, treasurer, G. W. Sullivan, secretary. T. A. Polonsky will be sales manager and S. L. May, is chairman of the board of directors. Mr. Polonsky has been a Huntington representative of the Portland Cement Association for several years.

The principal offices of the company will be in Huntington.

Flat slabs employed in Sawyer system of construction



"Picabb" tile. Note the center holes through which concrete is poured

A Live-Wire Products Manufacturer

THE following item appears in *The Western Builder* (Milwaukee, Wis.) and speaks for itself:

TO HOME BUILDERS

Gentlemen:

You will be interested to know that the Christoffel Concrete Products Co. has opened a Concrete Masonry Home Service Bureau. This means that we are ready to give out complete plans and specifications free to any contractor or home builder and with all information necessary to build a house that is beautiful, permanent, damp-proof and fireproof, warm in winter, cool in summer, and a house that requires practically no maintenance.

A concrete block wall covered on the outside with portland cement stucco makes an attractive house. With the inside furring, lathing and plastering and the air spaces that exist in the concrete block, a wall is obtained that makes the interior of the house comfortable both winter and summer.

The value of PORTLAND CEMENT stucco for an exterior finish has been proved by years of use. Any desired color or texture can be furnished.

You will find that this type of construction costs practically the same as a frame building.

Come in at any time and investigate. Phone North Milwaukee 415 and ask us where you can see a concrete masonry house. We shall be glad to go over all details with you.

Very truly yours,

CHRISTOFFEL CONCRETE PRODUCTS CO.
North Milwaukee, Wis.

P. S.—The Milwaukee Concrete Products Association has a wonderful three booth exhibit at the Home Show, Milwaukee Auditorium, March 28, to April 4, 1925.

Concrete masonry home construction will be displayed with all its advantages. The information and education you will gather there will convince you of its merits.

Conservatism!

AFTER experimenting with cement for 60 years, George W. Robertson, a Scotchman, has opened a small plant at Marion, Ohio, for the manufacture of a concrete block which he says is waterproof and unbreakable.—*Columbus (Ohio) Citizen.*

Bibliography of Publications on Effect of Soil Alkalies on Concrete Compiled

IN connection with an investigation by the Bureau of Public Roads of the United State Department of Agriculture concerning the effect of soil alkalies on concrete drain tile, a great many reference publications and articles were located. Believing that a compilation of these references into bibliographical form would be of great advantage to other investigators, the list was published in Department Bulletin 1314. The bibliography is believed to be fairly complete in respect to articles published prior to 1924.

The compilation took considerable time and labor, and in order that the results of this research may be made accessible to other investigators in similar studies, the bibliography has been issued in this form.

A copy of Department Bulletin 1314 may be obtained from the United States Department of Agriculture, Washington, D. C.

Net work of concrete poured inside of the Picabb tile—tile have been broken away to show interior molds

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Indiana and Illinois Sand, Gravel and Crushed Stone Freight Rates

THE question of freight rates on sand, gravel, and crushed stone between western Indiana and Illinois points is now under consideration jointly by the Interstate Commerce Commission, the Indiana Public Service Commission, and the Illinois Commerce Commission.

Tariffs were issued to take effect the early part of this year, purporting to cover a readjustment of the rates on a competitive basis but which was, in reality, a general plan of increases.

Important producers in Illinois and western Indiana filed protest with the respective commissions against the proposed changes as a result of which orders were issued suspending the rates until May 1, 1925. On March 18, 19, and 20, a joint hearing was heard at Indianapolis, Ind., before Examiner Fuller of the Interstate Commerce Commission, and Examiner H. S. McNeely of the Indiana Public Service Commission, at which time the individual railroads serving western Indiana plants attempted to justify the increased rates on sand, gravel and crushed stone from western Indiana plants to Indiana and Illinois markets. The several interested railroads made individual attempts to justify the proposed adjustment which was vigorously opposed by the Neal Gravel Co., the Western Indiana Gravel Co., Covington Sand and Gravel Co., Interstate Sand and Gravel Co., Montezuma Gravel Co., the Ohio and Indiana Stone Co., and the Mid-West Crushed Stone Co. The Federal Stone Co., and the Lehigh Stone Co. who are Illinois crushed stone producers were also present.

The main objections of western Indiana shippers appeared to be that long existing relationships, which had existed in the rates from Indiana plants to Illinois points as compared with the rates between Illinois points which had already been disturbed due to the previous general increases made in the rates, would be completely destroyed under the proposed adjustment and would severely handicap them from making future shipments to Illinois points. Many of the rates from important shipping points in Illinois to the same markets had not been changed by the proposed adjustment.

On March 26, and 27 a further joint hearing was held before Examiners Disque and Fuller representing the Interstate Commerce Commission and Examiner Zorn representing the Illinois Commission, at which the rates between Illinois points, which had been increased in the proposed adjustment, were under consideration.

Early in these proceedings producers of sand, gravel and crushed stone found themselves confronted with the likelihood of having either a mileage scale of rates established, or a zoning basis of rates which would recognize competition between railroads as well as competition between shippers so that instead of having the proposition cover rates from and to specific points, it seems to have now developed into the question of establishing some basis of rates from western Indiana to Illinois and between Illinois points which will stabilize the rate structure for the future.

To enable producers to give this matter consideration, as well as to recommend a basis to the railroads and the various commissions, the railroads voluntarily agreed to suspend the effective date of the proposed changes beyond May 1st. It was understood that shippers would present an alternative proposal to the railroads on or before May 11th and that on May 26th a conference would be held between the interested carriers and shippers with representatives of the Illinois, Indiana and Interstate Commerce Commissions present, for the purpose of arriving at a basis of rates which will be satisfactory to all interests.

These proceedings, which are being handled under Interstate Commerce Commission Dockets 2306 and 2307, are of great importance to producers in that territory as it will probably result in the Interstate Commerce Commission recommending a basis of rates for the future on sand, gravel and crushed stone between all points in the territory affected by this adjustment.

Alabama Cement Rate Case Decided by Commission

CONTROVERSY concerning freight rates on cement from various shipping points in the state, which constituted one of the most difficult problems the Alabama Public Service commission has been called upon to solve in recent months, has been unraveled and decided by the commission, in formal order issued recently.

The case embraced four different petitions and complaints submitted respectively, by the Louisville and Nashville R. R. Co., the Southern Ry. Co., the Lehigh Portland Cement Co. and the Gulf States Portland Cement Co. The Phoenix Portland Cement Co. was also concerned as an intervenor.

From Leeds and Ragland, cement shipping points, east of Birmingham, the present through rate on cement, applies by all available routes, to Florence, Sheffield and Tuscumbia. The Louisville and Nashville and Southern railroads desired to restrict the rate so that it would not apply via the Louisville and Nashville to Decatur, Ala., and via the Southern, beyond.

Regarding North Birmingham and Boyles, where cement plants are located, there was a difference of opinion whether the through rate now applies via the Louisville and Nashville to Decatur, and via the Southern beyond that point. Shippers contended that it did, while the railroads contended that it did not, the shippers contending that the route should be open so it could be used under the through rate provision.

From Spocari, near Demopolis, there are two available routes now open to Florence, Sheffield and Tuscumbia. The complainant, the Gulf States Portland Cement Co., asked that an additional route be opened by the Southern Ry. to Calera by the Louisville and Nashville to Decatur and by the Southern, beyond.

A great deal of cement is being used by the United States government at Muscle Shoals. Many years ago the Louisville and Nashville R. R. received land grant donations by the government, along the right of way from Birmingham to Decatur, in consideration of which donations, it is stated, the Louisville and Nashville R. R. agreed to haul government propery at a reduced rate, lower by about 50% than the regular rate.

All of the cement companies that could use the land grant route of the Louisville and Nashville R. R. to Decatur, could therefore bid on government business at a lower figure than those cement companies located at those shipping points that could not use this route. Closing of the route was objected to by a representative of the government at hearings held before the Public Service commission.

The Public Service Commission in the decision held that the laws of the state of Alabama do not give the commission jurisdiction over reduced rates granted to the federal government and that any discriminations resulting therefrom are legal. It was decided, however, that the government could

be dealt with on the same basis as any other shipper.

The route in controversy, it was ruled, should not be restricted to Leeds and Ragland. The tariff applying from Birmingham, Boyles and North Birmingham, was interpreted as authorizing the use of the land grant route under the through rate provision. As to Spocari, it was decided that the evidence in the case did not justify the opening of the through route suggested via Calera and Decatur.—*Montgomery (Ala.) Advertiser.*

Ottawa-Kokomo Sand Rate Investigated

THE Indiana State Chamber of Commerce, in accord with many similar petitions presented by them and most of which were fought to a succesful finish, asks for an adjustment of freight rates on sand shipped from Ottawa, Ill., that is used in quantities by potteries and glass factories at Kokomo, Ind. It is set forth that present freight schedules operate to discriminate against certain cities and in favor of others. C. L. Coapstick, traffic manager of the state chamber, states that his investigations into the matter revealed such cases as the example presented by Dayton, Ind., where Ottawa sand is shipped at the rate of $1.89 per ton, while to Kokomo the rate is $2.14 per ton. Mr. Coapstick avers that several cities in Indiana are entitled to the same rate that Dayton enjoys.

Eastern Lime Manufacturers Protest Freight Rates

THE Associated Lime Industries of Virginia, a voluntary association of manufacturers of agricultural lime in the state, has joined forces with a number of other lime manufacturers in the east in an effort to secure more favorable freight rates from eastern railroads.

T. D. Geoghengan, traffic commissioner for the lime industries of Virginia, and G. L. Connell, secretary of the Eastern Lime Manufacturers' Traffic Bureau, recently filed with the Interstate Commerce Commission an intervenors' brief, in behalf of their organization, in connection with the complaint of the Granger Manufacturing Co. of West Stockbridge, Mass., against the New York Central and other railroad companies.

The complaint of the Massachusetts firm, now on the commission's docket, alleges preferential and unreasonable rates for shipments of agricultural lime from Massachusetts to points in New York, New Jersey and Pennsylvania have been exacted by the railroads. The present rate schedules, it is claimed, favor Buffalo competitors.

In their brief filed recently, the intervenors complain that the freight rates on all forms of agricultural lime in trunk line territory are too high.

"We do not expect affirmative relief," they stated, "but are interested in the question of rates on lime in official classification territory." These reduced rates for Buffalo shipments were protested at the time they went into effect by lime manufacturers.

The Virginia lime manufacturers and other manufacturers associated with them as intervenors in the case claim that the present rates are not on a consistent basis and express their interest in securing a rate which will not be discriminatory.—*Norfolk (Va.) Ledger-Dispatch.*

Indiana Crushed Stone Companies Seek Lower Rate

A REDUCTION in freight rates of the Big Four and Pennsylvania railroads in hauling crushed stone between Greencastle and other Indiana points was asked in petitions filed before the public service commission by the Indiana Stone Co. and the Mid-West Crushed Stone Co., both of Greencastle, Ind.

In the petitions, it is alleged that by charging alleged excessive rates, the railroads are violating a state law. Rates on hauls of 39 to 50 miles from Greencastle range from 85 cents to $1.07 a ton, it is alleged, whereas the legal maximum rate is 63 cents a ton.

The petitions ask that the commission order the rates reduced to 63 cents a ton or less.—*Indianapolis (Ind.) Star.*

Two Brands of Imported Cement Barred at Seattle

ORDERS stopping the use of certain brands of imported cement for construction purposes in Seattle, Wash., were issued by Robert L. Proctor, superintendent of the city building department, following reports by his inspectors that frauds were being perpetrated in the sale of these brands.

W. C. Clothier, chief building inspector, declared that he had found upon inspection that cement, so deteriorated as to be practically worthless, was being worked over in violation of the city ordinances, put into sacks bearing the label of a superior brand, and placed on the market. The reconditioning work, he claimed, was being done at night.

"City ordinances require cement to have certain qualifications," Superintendent Proctor said. "The Washington, Oregon, and California cements, also several foreign cements come up to all requirements.

"Recently we learned that one firm was regrinding a foreign cement that had hardened in storage and become practically worthless, and selling it under another brand name as a better product."

The ban on the two cements had the effect of temporarily stopping work on several large buildings in Seattle.—*Seattle (Wash.) Post-Intelligencer.*

Chattanooga Cement Plants Meeting Big Demands

A NEWS dispatch from Chattanooga, Tenn., to the *New York Wall Street Journal* states:

"Cement demand has been unusually brisk since January 1 and local cement companies are having to expand their plants. Dixie Portland Cement Co. has completed rebuilding its new raw grinding department. It is now capable of grinding 2000 tons of rock and shale to a fineness of 90% through the 200-mesh sieve every 24 hours. This new raw mill gives it an increase of nearly 50% in capacity.

"Signal Mountain Portland Cement Co. is also running at capacity. This mill has concrete silos which will hold approximately 100,000 bbl. of cement. These, however, will not be needed until July when the additional unit under construction will increase plant's capacity from 3000 to 4500 bbl. a day."

Yosemite Portland Cement Corporation Being Financed

SUCCESS has attended the initial financing of the Yosemite Portland Cement Corporation, according to George D. Roberts and Co., who underwrote the issue of $1,500,000 class "A" 8% cumulative participating common stock.

The cement company, organized by industrial leaders of the San Joaquin Valley, which promises to be ably managed by A. Emory Wishon, is erecting an extensive cement plant near Merced, Calif., where it has acquired approximately 1000 acres of limestone and 1500 acres of clay deposits.

It is pointed out that the company has raw materials in sufficient quantity to operate its plant at full capacity for more than a hundred years.

In addition to President A. E. Wishon, officers are: W. A. Sutherland, Fresno banker, vice-president; Murray Bourne, general counsel San Joaquin Light and Power Co., secretary-treasurer. These officers, with Clyde Waterman and John B. Olcese of San Francisco and Bakersfield banking fraternities, respectively, constitute the directorate.

The company's common stock, which is being sold by George D. Roberts and Co., has been well received. It is cumulative and participating, enjoys exemption from the personal property tax in California and from the normal federal income tax.—*San Francisco (Calif.) Examiner.*

Work Started on Universal Cement Harbor at Buffington

PREPARATORY work on the construction of the $3,000,000 harbor for the Universal Portland Cement Co. at Buffington, Ind., as announced in previous issues of ROCK PRODUCTS, has been started with the arrival of dredging equipment and pile driving scows.

Considerable material has been shipped to the site, and contractors are now engaged in securing sufficient men to start the work.

Construction of the harbor will involve the construction of a breakwater far out in the lake, with piers extending nearly half a mile out into deep water. The inner end of the harbor will come within a short distance of the tracks of the New York Central and Pennsylvania and Indiana Harbor Belt railroads.

Contractors estimate that the construction of the harbor will require one year to complete.—*Chicago, Calumet Record.*

Preliminary Work for Imperial Valley Cement Plant Begun

ENGINEERS engaged by the American Portland Cement Co. of Los Angeles, Calif., left recently for the firm's property in the Imperial Valley to commence the work of surveying and laying out details for the new $750,000 cement manufacturing plant to be erected, according to announcement by W. L. Peck, president of the company.

"We hope to have the plant completed and in full operation within the next nine months or a year," said Mr. Peck, "since the demand for cement in Southern California is growing steadily." The company will first erect two units capable of producing 1000 barrels of cement a day.—*Los Angeles (Calif.) Times.*

Pacific Coast Plasterers Hold Conference and Visit Cement Plant

DELEGATES from Washington, Oregon, Utah, Nevada, Arizona and California numbering over 125 attended the Pacific Coast Conference of the Master Plasterers' Association held at Oakland, Calif.

Among the speeches made was one on "Hydrated Lime" delivered by Charles Cadman, president of the Pacific Lime and Plaster Co., in which the speaker pointed out the problems of lime manufacturers on the Pacific coast and thanked the plasterers for their cooperation in their solution.

Jack Butler, a chemist for the Pacific Portland Cement Co., Consolidated, spoke on "Hardwall Plaster" and Melvin S. Lewis, research agent in the division of vocational education at the University of California, explained many recent discoveries of interest to the delegates. The delegates were escorted to Redwood City where they inspected the cement plant of the Pacific Portland Cement Co., with Rex Thomson, Oakland representative of the company, acting as host.

Cement Is Fourth in Birmingham Industries

THE fourth factor now in the development of the Birmingham, Ala., industrial district is that of portland cement. Although a product of but comparatively few years' production on a big scale, 6,000,000 bbl. of the product are turned out there yearly.

Thirty thousand railroad cars are required to move the annual output of this product, 200 bbl. of cement to the car being the regulation load. To handle the output of the five portland cement plants of this state, four of them within a radius of 30 miles of Birmingham, two of them manufacturing 3,800,000 bbl. of cement, close to the city of Birmingham limits, a train 286 miles long would be necessary.

Ten million cloth sacks are used annually to pack and move the cement of this district, while 400,000 tons of coal are consumed in the plants. The lost, stolen and destroyed sacks per annum total 2,600,000, and to replace this loss 3000 bales of cotton are used in the manufacture of new sacks.

The five plants are the Phoenix Portland Cement Co., North Birmingham; the Lehigh Portland Cement Co., Tarrant City; the Atlas Portland Cement Co., Leeds, all in Jefferson county; the National Portland Cement Co. in Coosa county, about 30 miles from Birmingham, and the Gulf States Portland Cement Co. at Demopolis in Marengo county.

Each of these plants has limestone and shale deposits adjoining the manufacturing works. Four hundred thousand pounds of explosives, manufactured right in the home territory, are consumed annually in this development.

Despite the fact that 6,000,000 bbl. of cement are being manufactured every year and plans laid for a material increase, the estimate is made that there is limestone and other raw material right at hand to last the plants for 100 and more years. Geologists, experts and others have made borings and otherwise investigated the source of supplies of limestone, and the opinion is rendered that two and three generations will see the commodity being produced in this district on a large scale.

The use of portland cement is being increased rapidly and the home demand is requiring a large proportion of the 6,000,000 bbl. Not only are structures, houses and bridges being built with cement, but roads and other development.

Birmingham is one of the largest producers of permanent building materials. The city has the greatest slag producing works for concrete aggregates, reinforcing steel in abundance, while concrete building tile is being produced here in great quantity.

Birmingham's greatest factors are the coal and its varied products, the pig iron and its products, steel and its products and cement and its products. In this order the Birmingham outputs are known now throughout the world as well as at home.—*Birmingham (Ala.) News.*

Birmingham Cement Plants Active

PORTLAND cement manufacturers in the Birmingham, Ala., district are expecting the greatest year's business. Preparations are being made for an increase in production. Phoenix Portland Cement Co. is completing an addition which will increase the output of the plant 33⅓%, up to 2,000,000 bbl. annually. The Lehigh Portland Cement Co. recently completed an addition to its Birmingham plant, increasing its output to 1,800,000 bbl. annually. In addition, the latter company has built storage silos which wil care for thousands of barrels of cement for next winter.

The Atlas Portland Cement Co., the oldest manufacturing company in this district recently added a plant to produce its own bags. The National Portland Cement Co. and the Gulf States Portland Cement Co. plants are operating to capacity. These portland cement plants have been strong producers of traffic for the railroads in this territory. The use of portland cement is becoming more widespread in this section, not only in building, but in roadways and the prospects are that every barrel of the product that can be manufactured this year will find ready demand.—*New York Wall Street Journal.*

South Dakota State Cement Used Almost Entirely in State

SOUTH DAKOTA'S state cement plant at Rapid City had shipped 62 carloads of cement up to February 28, and aside from one car, all were consigned to South Dagota points, stated Paul Bellamy, manager of the plant, in an interview at Deadwood, S. D.

"The car of cement shipped out of the state was to Sheridan, Wyo.," Mr. Bellamy stated. "Most of the plant's product has been placed in the eastern part of the state, though Deadwood, Spearfish and Rapid City have bought large quantities."

The plant at Rapid City is operating nicely now, Mr. Bellamy declared, and unless unforeseen difficulties arise, should continue to do so. At present experiments are being conducted with different kinds of coal. It has been demonstrated that the dryer now in operation is not satisfactory for the cheaper grades of coal which Mr. Bellamy proposes to use."

Mr. Bellamy refused to comment upon the legislature's investigation of the old cement commission.

"I'm there to run the plant," he said, "and am not interested in post mortems."—*Sioux Falls (S. D) Argus-Leader.*

H. W. Hawley, Los Angeles Sand and Gravel Man, Is a Fighter

HERE is another chapter in the long-drawn-out battle between H. W. Hawley, president of the Los Angeles Rock and Gravel Co. and the city fathers of Los Angeles:

The city council can get away with lots of things, but, by golly, it can't hoodwink or bullyrag or bamboozle the Los Angeles Rock and Gravel Corporation.

This proposal of the corporation to sell the city its gravel beds in the Arroyo Seco cannot be ignored any longer, Charles H. Mattingly intimates. Mr. Mattingly is attorney for H. W. Hawley, president of the Rock and Gravel Corporation, and he delivers his letters to the council in person with an emphatic wave of the hand. He appeared at the city hall recently with his second letter this month. Councilmen, hitherto languid in this rock and gravel matter, started and turned pale when they read this paragraph:

"We will continue our operations in the Arroyo in the future as in the past, under the protection of the Stars and Stripes, the constitutions of the United States and of the state of California."

Later on, the letter said:

"The consent and approval of your honorable body to our operations, precisely similar to your own, while desirable are not necessary."

When the letter reached the office of City Attorney Stephens there was a noticeable flurry, but it was denied that another injunction was forthcoming. The last injunction, it was explained, was taken out only two weeks ago and it is a legal question whether the city has a right to get out an injunction against a gravel company oftener than once a month.

The city charter is not clear on the point at present.—*Los Angeles Times.*

Boiler Explosion at a Pittsburgh Sand and Gravel Plant

SEVERAL persons were endangered when a 26-ton steel boiler of the J. P. O'Neil Sand Co., McCandless avenue, Pittsburgh, Penn., near the Allegheny river, blew up and shot over a six-foot fence and 75 ft. into the street.

J. H. O'Neil, engineer of a derrick operated by the boiler, was on the lee side of the blast as were William Layne, the fireman, and four other employes of the sand company. The fireman said he had fired the boiler a short time before and believed that there was about 90 pounds pressure on at the time. He just had filled the water gauge and walked away when the explosion occurred.—*Pittsburgh (Penn.) Post.*

Eddyville, Iowa Sand and Gravel Plant Under Construction

PLANS for the new sand and gravel plant of the Iowa Sand and Gravel Corporation, previously announced, are materializing. Contracts have been closed by manager, Harry D. Bellamy with the Des Moines Electric Light Co. for the construction of a power line from Oskaloosa to the site of the new plant and with the M. & St. L. R. R. for a connecting spur from the main line.

The plant will be located on the Des Moines river just north of the city and when completed in the latter part of May will have a capacity of 35 cars daily. The belt conveyor for carrying the material to the washing and screening plants after being pumped ashore will be 175 ft. long and elevate the material to a height of 35 ft. Storage bins will be of concrete.

Walter C. Lloyd Heads New Company

ORGANIZED with a capital stock of $50,000, the Walter O. Lloyd and Co., Inc., of Poughkeepsie, N. Y., will operate the former business of Walter O. Lloyd, contractor, and the Poughkeepsie Sand and Gravel Co., Inc. Mr. Lloyd is president of the new company; William Harold W. Drake of New Haven, Conn., is vice-president, and William B. Hamill of Poughkeepsie is secretary and treasurer. All three members hold equal shares in the business. The company owns about 50 building lots in addition to its sand and gravel pit.

New Company Building Gravel Plant Near Lansing, Michigan

ELEVEN Lansing men have organized the Chief Okemos Gravel Co. which is to operate on the Rabey farm east of Lansing, Mich. The company is incorporated for $30,000 and is installing new equipment in a pit opened a year ago.

The organizers of the company are: Victor S. Saier, E. H. Clark, A. E. Foster, Peter Spanos, John Otto, John W. Tracy, C. E. Stabler, T. A. Lawler, A. J. Edwards, D. D. Creyts and Angel Priggooris.

Land on which the pit is located has been leased for a term of years. The Michigan Electric railway line crosses one end of the land and sidetrack connections are being made.

Officers of the concern are: C. E. Stabler, president; T. A. Lawler, vice president and A. J. Edwards, secretary-treasurer. These together with John W. Tracy, D. D. Creyts, E. H. Clark and A. E. Foster constitute the board of directors.—*Lansing (Mich.) State Journal.*

Fort Worth, Texas, Gravel Demand Increases

THE gravel business, as a barometer to the amount of building going on, shows that Fort Worth is now on a building boom. The tonnage of sand and gravel supplied to the builders in Fort Worth during the months of January and February, 1925, is more than double any previous January and February in the history of the city.

The gravel business is one of the great silent industries. Last year one plant shipped over 265,000 tons of sand and gravel. About one-third of this amount was used in Fort Worth. The balance was shipped to neighboring towns or used by the railroad companies as track ballast. This is an average monthly production of over 22,000 tons, while the January and February production of this plant was over 30,000 tons per month, and these months are ordinarily the very lightest of the year.

"The best way to get an idea of the magnitude of the gravel industry would be to watch the gravel truck come from the city distributing yards of the Fort Worth Sand and Gravel Co., on East Seventh Street at the rate of 100 tons per hour," one contractor said. Here the sand and gravel is graded, washed, screened or made into ready mixed concrete for delivery to the builder, as specified. The central concrete mixing plant was the first one of its kind to be built in Texas and its capacity of 300 yds. per day is being doubled.—*Ft. Worth (Tex.) Record.*

Flint, Michigan Awards Sand and Gravel Contracts

SAND and gravel contracts have been awarded by the city of Flint, Michigan as follows: Fuller-Becker Sand and Gravel Co., 20,000 yards of fine aggregate at $1.60 per net ton and 20,000 yards of coarse aggregate at $2.00 per net ton, to be delivered along line of work; Bayer-Brice Gravel Co., 8000 yds. of 60-40 gravel at $2.45 per cu. yd. weighing 3000 lb., to be delivered along line of work; Flint Builders Supply Co., 20,000 yds. of coarse aggregate at $1.29 per net ton and 20,000 yards of fine aggregate at $0.95 per net ton, to be delivered in carload lots at city yards; Genesee Gravel Co., 15,000 tons of asphalt filler at $1.19 per net ton, to be delivered in carload lots at city yards.

Building New Sand and Gravel Plant at Bellevue, Iowa

I. E. DUVALL, formerly manager of the Sabula Sand & Gravel Co., at Sabula, Iowa, is now manager for the Bellevue Sand & Gravel Co., at Bellevue. The company is now building a new plant and expects to begin operation in April.

New Lime Company to Build $1,000,000 Plant at Woodville, Ohio

THE Bruns Lime Works, Inc., of Woodville, Ohio, is taking bids on a $1,000,000 plant which will include a power house, six kilns and a hydrating plant. D. C. Henley is general manager and S. W. Jameson is construction engineer.

Fire Causes $50,000 Damage at Wisconsin Lime Plant

FIRE recently destroyed 5000 cords of wood and four kilns of the Nast Brothers lime works at Nasbro, near Lomira, Wis. Loss is estimated at about $50,000. The blaze, the cause of which is unknown, started in a small shed near one of the kilns.

The flames spread rapidly and the firemen found their efforts of little avail. Two men were injured by falling timbers.—*Beloit (Wis.) News.*

Lehigh Company to Operate Alsen's Cement Plant

JUDICIAL CONFIRMATION of the sale of the Hudson Valley Cement Corporation's mill at Alsen, N. Y., to the Lehigh Portland Cement Co., of Allentown, Penn., according to *The Dow Service*, New York City, daily building report of April 11, "unveils another coup by Samuel R. Rossoff, the former immigrant, who figured prominently in the news recently as the contractor selected to build the new subway system in New York."

The statement goes on to say that the deal brings to the Hudson valley another active cement manufacturing establishment already operating 18 plants throughout the United States from coast to coast, and, incidentally, puts the Hudson valley cement producing district in fair rivalry with that of the Lehigh Valley cement producing district heretofore the biggest and most dominant in the country, if not, indeed, in the world.

Furthermore, the transaction establishes the likelihood of other firms locating in the district if they wish to compete in this market because of the great difference in cost of shipping cement from Hudson valley points by water to New York as opposed to shipping this weighty material by rail from Pennsylvania to this market and beyond.

One time the Alsen's Cement Co. was a factor in the cement consuming markets of the world. The parent company was in Germany and the products of that company, with the equally famous Dyckerhoff, not only was perhaps the biggest selling cement in all the two American continents, but for the highest grade of work it long retained a hold upon the preference of discriminating architects and builders in New York, even after the American made product was proved to be of superior quality.

In fact the New York market was big enough to warrant the establishment of a branch of the Alsen's company of Germany in the Hudson valley under the name of the American Alsen's Portland Cement Co. Its offices were at 45 Broadway in the old Hamburg-American building.

When the American plant was taken over during the world war by the U. S. Custodian of alien property the enterprise was dormant until it was finally sold to W. J. Fallon, who floated an extensive bond issue, but operated the plant only about a year and a half.

Knowing something about the dominance of the old Alsen's Cement Co., but a great deal more about the difference in freight rates existing or that seemingly could possibly exist by rail between the Lehigh Valley in Pennsylvania and the New York market, and the advantages of obtaining easy access to New York for this extremely heavy building and engineering commodity by boat from plant to dealers' docks, and, perhaps, to international ports from New York, notably Canada and South America and intermediate harbors; some of the bonds floated by Fallon were taken up by Rossoff.

When work at the plant stopped, Rossoff, to protect his equity in the plant then known as the Hudson Valley Cement Corporation, found that other bond holders had less faith in the possibilities of the Hudson Valley becoming a profitable cement producing center than he had, mainly because they did not know, as he did, that government tests of the rock-strata in the vicinity of Catskill assayed rich and almost inexhaustible in the kind of rock from which cement is principally made. In this way Mr. Rossoff accumulated over $1,000,000 in bonds for which, he says, he has now been paid in full and his interest in the cement plant has ceased in favor of crushed stone which, he believes, will be in demand in this city during subway-building years, at least, in far greater volume than ever before.

Meanwhile the Lehigh Portland Cement Co. announces from its New York offices, 17 East 42nd Street, that it will take over the property immediately and proceed to the erection of a mill that will be thoroughly modern and designed to ship by both rail and water.

New Hudson River Rock Crushing Plant

WORK will start on a new crushing plant at Jones Point, 35 miles up the Hudson river, near Peekskill about May 1, according to a statement from official sources in *The Dow Service* daily building reports, New York City on April 11. The plant will be erected and operated by Samuel R. Rossoff or a subsidiary company in conjunction with his sand and gravel plants along the Hudson and will have a capacity of 5000 yards per day.

New Bedford, Massachusetts, Bids on Crushed Stone, Sand and Gravel Cement

THE bids submitted for the proposals of the city of New Bedford, Mass., for this year on crushed stone, sand, gravel and cement were:

Crushed stone—Connecticut Quarries Co., No. 1 Connecticut trap rock, $3.50 per ton; No. 2, $3.75, No. 3, $3.90, No. 4, $4.05; Kennedy Construction Co., $3.35 per ton delivered as wanted; Blue Stone Quarries, all sizes as wanted at $3.30 per ton to all parts of city; Sullivan Granite and Construction Co., $3.40 per ton as wanted; Roger T. Fay, all sizes as wanted at $2.80 per ton for New Haven Trap Rock Co.'s stone.

Gravel—Blue Stone Quarries, unscreened, $1.15 delivered; John Chicoine, pea gravel, $2.75 per ton, ½-in. gravel, $2.00, unscreened, $1.10; O'Connor Bros., pea gravel $2.35 per ton, screened $1.75, unscreened $1.20; Sullivan Granite and Construction Co., pea gravel $1.85, bank gravel $1.25 per ton.

Sand—John Chicoine, $1.20 per ton delivered; O'Connor Bros., $1.10 per ton to city yard, $1.20 delivered; P. A. Manchester $0.95 per ton to city yard; Sullivan Granite and Construction Co., $1.05 to city yard, $1.15 delivered.

Portland cement—J. Arthur Denault, 87½ at warehouse, 89½ delivered; Borden and Remington, 90 at city yard; Cape Cod Sand and Cement Co., 86½ at storehouse, 89 delivered; H. F. Kingsley, 87½ at warehouse, 90 delivered. All cement bids allow 9 cents rebate for sacks.

Development of Gulf States Portland Cement Company Plant Rumored

CLARENCE S. STEWARD, former vice president of the Signal Mountain Portland Cement Co., and A. C. Deer, former manager of the company's plant, are reported to have purchased large blocks of stock in the Gulf States Cement Co., located at Demopolis, Ala. Col. Steward, when interviewed would not make a statement for publication.

F. A. Stephenson, of Signal Mountain, who has long been prominent in the cement industry of the middle west, is a heavy stockholder in the Gulf States company and it is understood reorganization and refinancing of the Alabama plant will be undertaken in the near future.

It is said to be the intention of the owners to convert the Alabama plant, which now uses a dry process, into a wet process plant similar to that in operation by the Signal Mountain Portland Cement Co. The rehabilitation of this plant will call for the expenditure of approximately $1,750,000, it was said.—*Chattanooga (Tenn.) Times.*

Ideal Cement Company Makes Surveys for New Plant

PRELIMINARY surveys of the site of the cement plant on which the Ideal Cement Co. will begin actual construction of the $2,000,000 cement plan in May has been begun by engineers of the company under the direction of Paul C. Van Zandt, chief engineer. Lines have been run for the proposed switches to the Union Pacific and Colorado and Southern railroads and surveys made for the location of water rights. The engineering staff has plans far advanced and machinery and equipment have been ordered so that it will be delivered and installed as rapidly as the construction is completed.

Local newspaper reports state that the plant will have two kilns and have a capacity of about 2500 bbls. per day. It will be the most modern dry process plant that can be built and be one of the largest cement plants west of the Mississippi river.

The limestone will be quarried near the plant using electrical power shovels for loading the rock into cars, which will be drawn to the plant over standard gauge tracks by electrically driven locomotives.

Gas from the Union Oil Co.'s wells will be used for fuel in the plant and steam generated by waste heat boilers will be used to generate electricity.

Ideal Cement

It is rumored that the Ideal Cement Co. is making surveys of another site seven miles west of Fort Morgan, Colo., on which it is considering the construction of a plant similar to the Fort Collins plant.

Installing Electrical Equipment at Northern Indiana Gravel Plant

ELECTRICAL equipment is being installed at the plant of the Northern Indiana Sand and Gravel Co. at Wolcottville, Ind. One 100 h.p., one 20-h.p. and one 5-h.p. motor is being installed as a a start toward complete use of electrical power.

Buffalo Gravel Firm Buys Two Steamers

ANNOUNCEMENT has been made that Capt. Benjamin L. Cowles of the Cowles Towing & Shipbuilding Co. has sold the steamers *Lakeport* and *Lakeland* to R. W. Eberly, general manager of the Buffalo Gravel Co., Buffalo, N. Y. Cowles acted for W. R. Woodruff of the Lake & St. Lawrence River Transportation Co., of which Capt. F. J. Peterson of Cleveland is general manager.

One of the steamers will be fitted out at once to be used as a sandsucker but just what the other will be used for in the meantime has not been decided.—*Buffalo (N. Y.) Courier.*

New Missouri Gravel Company to Build Plant at Warsaw

PLANS have been perfected for the location of a sand and gravel plant at Warsaw in Benton county, Mo., on the Osage river, by the newly formed Warsaw Gravel Co. The construction of the plant will be carried on rapidly and the company expects to begin operation soon, according to Jefferson City newspapers.

The company will be incorporated for $80,000 subscribed in equal shares by C. W. Thomas, F. E. Ross, H. B. Church, Jr. and Hugh Stephens, all of Jefferson City, where the company will have its offices.

Chicago Consumers Company Will Operate at Gary Sand Dunes

CLIFFORD AND SONS, who had the contract for removing the sand hills from the 1200-acre tract owned by the Inland Steel Co., just east of the Gary, Ind., city limits, have transferred their contract and sold their equipment to the Consumers Co. of Chicago, which will continue the work until the last sand from the dunes has been shipped to Chicago, where it will be used for track elevation purposes and for building material.

The Consumers Co. now has three steam shovels in operation, but will place several others in commission in a short time.—*Gary (Ind.) Tribune.*

Wilson Sand Company to Build New Plant at Kenova, W. Va.

THE Wilson Sand and Supply Co. of Huntington, W. Va., has completed plans for the erection of a new $60,000 sand and gravel plant at Kenova, which will be one of the most modern plants of its kind on the Ohio river, Charles R. Wilson, president of the company, announced recently in the Huntington *Herald-Dispatch.*

The Kenova plant will be electrically driven and will be equipped with the most modern sand and gravel machinery obtainable. It will have a daily output of approximately 1000 yards of sand and gravel.

The plant will be located on the Ohio river front and 20 men will be employed in the beginning of operations.

It is planned that the plant will be ready for operation within the next 30 days. Stephen-Adamson Manufacturing Co. will furnish the equipment, much of which is already on the site of the plant.

A new derrick boat, which was purchased at a cost of $15,000, will be included in the equipment. A steel bin with a capacity of 2000 yards of sand will be installed with a special loading device to load trucks and railroad cars for deliveries.

The Wilson company recently bought seven steel barges, each costing $12,000 to be used in service at Huntington. These are on the way now. A new steam boat, The Charles R. Wilson, will also be in use at the company's plants at Huntington, Kenova and Ashland. The company has a fleet of approximately 20 barges, all but four of them steel.

Kelley Island Sand-Sucker "Penobscot" Sold

THE sandsucker *Penobscot* which has been operated by the Kelley Island Lime and Transport Co. since 1917 has been sold to the River Sand and Gravel Transit Co. of Marine City, Mich.

The company is now at work refitting her and installing a new unloading device. The *Penobscot* is 129 ft. long and has a beam of 27 ft. and has a capacity of 250 yds. for sand.

The other sand boats of the company are being fitted out now and will leave for the sand beds as soon as possible. The sand piles are getting very low and new sand is badly needed.—*Sandusky (Ohio) Star-Journal.*

New Sand Company Will Build Plant at Lake Wales, Fla.

THE Diamond Sand Co. has been organized, with C. G. Memminger president; E. C. Stuart, vice-president; S. D. Gooch, vice-president and general manager, and J. K. Stuart, secretary-treasurer. The company has bought a large acreage east of Lake Wales, Fla., along the seaboard, on which there has been discovered a deposit of building sand. The place is three miles east of Lake Wales and a station named Diamond has been established. The company, which is capitalized at $300,000, will put in a plant with a capacity of from 40 to 50 cars a day of the sand and capable of being doubled should the need arise.—*Tampa (Fla.) Tribune.*

Build Amiesite Asphalt Plants in Arkansas

THE chief engineer for the Amiesite Asphalt Co., and E. J. McInerney, an officer of the company, are in Russellville, Ark., making arrangements for establishment of an "Amiesite" manufacturing plant for manufacturing this product for the Dover highway and other construction work in this part of the state.

They have leased ground in the eastern part of the city and Mr. McInerney announced that assembling of material for the plant will commence at once.

Head offices of this company are in Dallas, Texas, but they are entering Arkansas because of the big road building program now under way, and will locate another manufacturing plant in Little Rock. Stone, asphalt and fuel oil are the principal materials used in "Amiesite," and for construction work in Arkansas these materials can be assembled at local plants and distributed at points of consumption much cheaper than they could be handled through the Dallas factory.—*Ft. Smith (Ark.) Record.*

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30 per net ton all sizes					
Chaumont, N. Y.	1.00	....	1.75	1.50	1.50	1.50
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	....
Northern New Jersey	1.60	1.80	1.80	1.40	1.40	....
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	....
Walford, Penn.	....	....	1.35	1.50	1.60	1.60
Watertown, N. Y.	.50	....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.75	....	1.75	1.50	....	....
Bloomville, Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio: Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo, Iowa	1.10	....	1.35	1.05	1.10	1.10
Chicago, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Columbia, Krause, Valmeyer, Ill.	1.20	1.20	1.20	1.10	1.10	1.10
Cypress, Ill.	1.25	1.15	1.10	1.10	1.10	1.10
Dundas, Ont.	.70	1.05	.90	.90	.90	.90
Greencastle, Ind.	1.30	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Linwood, Iowa	1.00	1.25	1.25	1.05	1.05	1.15
Northern New Jersey	1.30	....	1.80	1.60	1.40	....
River Rouge, Mich.	1.00	1.00	1.00	1.00	1.00	1.10
Sheboygan, Wis.	1.10	....	....	1.10	1.10	....
St. Vincent de Paul, P. Q.	.85	1.35@1.45	1.00@1.10	.95@1.00	.90	1.00
Stone City, Iowa	.75	....	1.20†	1.10	1.05	....
Toronto, Ont.	1.60	1.95	1.80	1.80	1.80	1.80
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
Wisconsin Points	.50	1.00	....	.90	.90	....
Youngstown, Ohio	....	....	....	1.50	1.60	1.60
SOUTHERN:						
Alderson, W. Va.	.50	1.60	1.60	1.50	1.40	1.20
Bridgeport, Texas	1.00	1.00@1.35	1.35	1.25	1.25	1.10
Cartersville, Ga.	1.65	1.65	1.65	1.15	1.15	1.35
El Paso, Texas	1.00	1.00	1.00	1.00	1.00	....
Ft. Springs, W. Va.	.60	1.60	1.60	1.50	1.40	....
Graysville, Ga.	1.00	....	.85@1.10	.85@1.00	.85@1.00	....
WESTERN:						
Atchison, Kans.	.25	2.00	2.00	2.00	2.00	1.60‖@1.80
Blue Spr'gs & Wymore, Neb.	.20	1.45	1.45	1.35@1.40	1.25@1.30	1.20
Cape Girardeau Mo.	1.35	....	1.25	1.25	1.00	....
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65
Rock Hill, Mo.	1.55	1.15	1.15	1.15	1.10	1.10

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	....
Duluth Minn.	1.00	2.25	2.00	1.75	1.35	1.35
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Minneapolis, Minn.	1.25	....	2.25	2.00	1.75	....
New Haven, Wallingford and Britain, Conn.	.60	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.50	2.00	1.80	1.40	1.40	....
Oakland and El Cerrito, Calif.	1.75	1.75	1.75	1.75	1.75	....
San Diego, Calif.	.50@ .75	1.80@1.90	1.60@1.80	1.35@1.55	1.35@1.55	1.25@1.45
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	....
Springfield, N. J.	1.70	2.10	2.00	1.70	1.60	....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	1.10

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.—Granite	1.50	1.60	1.35	1.25	1.25	1.00
Coldwater, N. Y.—Dolomite	1.50 all sizes					
Columbia, S. C.—Granite	.50	2.00	1.75	....	1.60	....
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia Ga.—Granite	.75(c)	1.75	1.66	1.25	1.25	....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	....
Middlebrook, Mo.—Granite	3.00@3.50	....	2.00@2.25	2.00@2.25	....	1.25@2.00
Northern New Jersey (Basalt)	150	2.00	1.80	1.40	1.40	....
Richmond, Calif. (Basalt)	.75*	....	1.50*	1.50*	1.50*	....

*Cubic yd. †1 in. and less. ‖Rip rap per ton. (a) Sand.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 97% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	6.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—Analysis, 93.5% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh	1.50
Cartersville, Ga.—Analysis, 68% $CaCO_3$, 32% $MgCO_3$; pulverized	3.00
50% thru 100 mesh	1.75
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00
Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk	3.00
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, $5.00; bulk	3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.10; bulk	3.60
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton	2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@4.50
Mountville, Va.—Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 50% thru 100 mesh, 100% thru 20 mesh—125-lb. hemp bags	5.00
Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Waukesha, Wis.—Pulverized	4.00
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; bags, 4.00; bulk	2.50
West Stockbridge and Rockdale, Mass., Danbury, Conn., North Powna, Vt.—Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25

Agricultural Limestone

(Crushed)

Alderson, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Alton, Ill.—Analysis, 97% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh	2.00
Bedford, Ind.—Analysis, 98½% $CaCO_3$, 1% $MgCO_3$; 90% thru 10 mesh	1.50
Bettendorf, Iowa—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Blackwater, Mo.—77% $CaCO_3$; 100% thru 8 mesh, 25% thru 100 mesh	1.00
Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh	.80
Chico, Texas—100% thru 4 mesh	1.50
100% thru 10 mesh, bags, 5.00; bulk	2.00
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh	1.20
Cypress, Ill.—90% thru 100 mesh	1.25
50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	1.15
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Garrett, Okla.—All sizes	1.25
Kansas City, Mo.—50% thru 100 mesh	1.25
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk	1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@ 2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind. — Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh	1.60
Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 30.8% thru 100 mesh, 38% thru 50 mesh	1.45@ 1.60
Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh	1.50
Pixley, Mo.—Analysis, 96% $CACO_3$; 50% thru 50 mesh	1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh	1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—Test, 107.38% bone dry, 100% thru 10 mesh; bags, 2.85; bulk	2.10

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk	3.00@ 3.50
Waukesha, Wis.—Bulk	4.00

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton.

Glass Sand:	
Berkeley Springs, W. Va.	2.00@ 2.25
Cedarville and S. Vineland, N. J.—Damp	1.75
Dry	2.25
Cheshire, Mass.: 6.00 to 7.00 per ton; bbl.	2.50
Columbus, Ohio	1.25@ 1.50
Estill Springs and Sewanee, Tenn.	1.50
Grays Summit and Klondike, Mo.	2.00
Los Angeles, Calif.—Washed	5.00
Mapleton Depot, Penn.	2.00@ 2.25
Massillon, Ohio	3.00
Oceanside, Calif.	3.00
Ohlton, Ohio	2.50
Ottawa, Ill.—Chemical and mesh guaranteed	1.50
Pacific, Mo.	2.25@ 3.00
Pittsburgh, Penn.—Dry	4.00
Damp	3.00
Red Wing, Minn.: Bank run	1.50
Ridgway, Penn.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
San Francisco, Calif.	4.00@ 5.00
St. Louis, Mo.	2.00
Sewanee, Tenn.	1.50
Thayers, Penn.	2.50
Zanesville, Ohio	2.50
Miscellaneous Sands:	
Aetna, Ind.: Core, Box cars, net, .35; open-top cars	.30
Albany, N. Y.: Core	1.50
Molding fine, brass molding	2.25
Molding coarse	2.00
Sand blast	3.50
Arenzville and Tamalco, Ill.: Molding fine and coarse	1.40@ 1.60
Brass molding	1.75
Beach City, Ohio: Fine core	1.75
Furnace bottom	2.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Buffalo, N. Y.	1.10	.95			.85	
Erie, Penn.		1.25		1.50	1.75	
Farmingdale, N. J.	.58	.48	1.05	1.20	1.10	
Leeds Jct., Maine		.50	1.75		1.35	1.25
Machias Jct., N. Y.		.75	.75	.75	.75	.75
Montoursville, Penn.	1.00	1.10	1.25	1.00	.90	.80
Northern New Jersey		.50	1.25	1.25	1.25	
Olean, N. Y.		.90	.75	.75	.75	.75
Pittsburgh, Penn., and vicinity	1.25	1.25	1.00	1.00	.85	.85
Shining Point, Penn.			1.00	1.00	1.00	1.00
Washington, D. C.—Rewashed, river	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Ind.	.75	.75	.75	.75	.75	.75
Barton, Wis.		.60	.80	.80	.80	
Chicago, Ill.	1.35	1.75	1.75	1.75	1.75	1.75
Columbus, Ohio	.75	.75@1.00	.75	.75@1.00	.75@1.00	.75
Covington, Ind.	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.40	1.50	1.50	1.50	1.50
Eau Claire, Wis.		.40	.85@1.25		.85	
Elkhart Lake, Wis.	.60	.40	.50	.50	.50	.60
Ft. Dodge, Iowa		2.05	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Rapids, Mich.		.50		.80	.70	.70
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50		.80		.70
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn.	.40					1.25
Milwaukee, Wis.		1.01	1.21	1.21	1.21	1.21
Minneapolis, Minn.*	.35	.35	1.35	1.25	1.25	1.25
Northern New Jersey	.45@ .50	.45@ .50		1.25	1.25	
Palestine, Ill.	.75	.75	.75	.75	.75	.75
St. Louis, Mo., f. o. b. cars	1.18	1.45	1.65§	1.45		1.45‖
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.60	.90	.90	.85	.85
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.55	.60	.65	.65
Winona, Minn.	.40	.40	1.25	1.10	1.00	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.			Average .40@.60			
Zanesville, Ohio	.70	.60		.60	.90	.90
SOUTHERN:						
Brookhaven, Miss., Roseland La.	1.75*	.70	2.25	1.50	1.25	
Charleston, W. Va.		All sand 1.40 f.o.b. cars.		All gravel 1.50 f.o.b. cars.		
Chehaw, Ala.	00@ .30		.40	.50		
Estill Sp'gs & Sewanee, Tenn.	1.00	.90	1.00	1.00	.85	.85
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Macon and Gaillaro, Ga.	.50	.50		.60	.65	.65
New Martinsville, W. Va.	.90	.90				.90
Roseland, La.	.60	.50	2.25	1.25	1.25	1.50
Smithville, Texas		.90	.90	.90	.90	.75
WESTERN:						
Baldwin Park, Calif.	.20	.20	.40	.50	.50	
Kansas City, Mo.	.80	.70				
Los Angeles, Calif.	.50	.50	.92	.92	.92	
Pueblo, Colo.	1.10*	.90*		1.60*		1.50*
San Diego, Calif.	.50	.50	1.20	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.50	1.50	1.50	1.50	1.50	1.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel. 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Brookhaven, Miss., Rosel'd, La.			Road gravel, ballast gravel .60 a ton			
Chehaw, Ala.	00@ .30					
Des Moines, Iowa		Washed, .65; unwashed, .40 (not screened)				
Dudley, Ky. (crushed silica)	1.10	1.10		.95		
East Hartford, Conn.			Sand, .65 per cu. yd.			
Elkhart Lake, Wis.	.50					
Gainesville, Texas		.95				.55
Grand Rapids, Mich.				.60		
Hamilton, Ohio					.70	
Hersey, Mich.				.55		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas						.55
Macon and Gaillaro, Ga.		.35				
Mankato, Minn.			Pit run gravel, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.						.60
St. Louis, Mo.			Mine run gravel 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.50
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10					
Zanesville, Ohio		.60				

*Cubic yd.; (b) river run.

Miscellaneous Sands

(Continued from preceding page)

Molding fine and coarse		2.00
Traction unwashed and screened		1.75
Cheshire, Mass.—Furnace lining, molding fine and coarse		5.00
Sand blast	5.00@	8.00
Stone sawing		6.00
Columbus, Ohio:		
Core	.30@	.50
Furnace lining, molding coarse	2.00@	2.25
Molding fine	2.50@	2.75
Sand blast	4.00@	4.50
Stone sawing		1.50
Traction	.50@	.75
Brass molding	2.50@	3.00
Dresden, Ohio:		
Core	1.25@	1.50
Molding fine	1.50@	1.75
Molding coarse		1.50
Traction		1.25
Brass molding		1.75
Dunbar, Penn.:		
Traction (damp)		2.00
Eau Claire, Wis.:		
Sand blast	3.00@	3.25
Roofing sand		4.25
Traction	.40@	.65
Elco, Ill.:		
Ground silica per ton in carloads	22.00@	31.00
Estill Springs and Sewanee, Tenn:		
Molding fine and core		1.25
Roofing sand, sand blast, traction	1.35@	1.50
Franklin, Penn.:		
Core		2.00
Molding coarse and fine		1.75
Grays Summit and Klondike, Mo.:		
Molding fine, core and stone sawing	1.75@	2.00
Joliet, Ill.:		
No. 2 molding sand; also loam for luting purposes and open-hearth work	.65@	.85
Klondike, Mo.:		
Molding fine	1.75@	2.00
Mapleton Depot, Penn.:		
Molding fine and sand blast		2.00
Traction	2.00@	2.25
Massillon, Ohio:		
Molding fine, coarse, furnace lining core and traction		2.50
Michigan City, Ind.:		
Core and traction	.30@	.40
Montoursville, Penn.:		
Core	1.35@	1.50
Traction	1.00@	1.10
New Lexington, Ohio:		
Molding fine		2.50
Molding coarse		1.50
Ohlton, Ohio:		
Core and sand blast, both green		2.00
Roofing sand, furnace lining, molding fine and coarse, stone sawing, traction, all green		1.75
Add 50c a ton for green sand dried.		
Oceanside, Calif.:		
Roofing sand		3.50
Ottawa, Ill.:		
Molding coarse (crude silica sand)	.75@	1.00
Sand blast		3.50
Stone sawing		1.50
Pacific, Mo.:		
Core, furnace lining	1.00@	1.25
Molding fine	.90@	1.00
Stone sawing	1.00@	1.75
Molding coarse	.85@	1.00
Red Wing, Minn.:		
Core, furnace lining, stone sawing		1.50
Molding fine and coarse, traction		1.25
Sand blast		3.50
Filter sand		3.75
Ridgway, Penn.:		
Core		2.00
Furnace lining, molding fine, molding coarse		1.25
Traction		2.25
Round Top, Md.:		
Core		1.60
Traction, damp		1.75
Roofing sand		2.25
St. Louis, Mo.:		
Core	1.00@	1.75
Furnace lining		1.50
Molding fine	1.50@	2.50

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.35	1.35	1.35	1.35	1.35	1.35	1.35
E. Canaan, Conn.	3.00	1.00	2.25	1.25	1.25	1.15	1.15
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Emporium and Du Bois, Penn.		1.35	1.35	1.35	1.35	1.35	1.35
Reading, Pa.	2.50	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.45	1.65	1.45		1.45	
Jackson, Ohio		1.05		1.30	1.05	1.30	1.30
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	2.25	1.55		1.55	1.55	1.55	
Ensley and Alabama City, Ala.	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.20
Buffalo, N. Y.		12.00	12.00	12.00				
Lime Ridge, Penn.							5.00a	
West Stockbridge, Mass.		10.50	5.60					2.25m
Williamsport, Penn.			10.00				6.00	
York, Penn.		10.50	10.50	11.50			8.50	1.65i
CENTRAL:								
Cold Springs, Ohio		10.00	9.00		9.00	11.00	9.00	
Delaware, Ohio	12.50	10.00	9.00	10.50			9.00	1.50
Gibsonburg, Ohio	12.50				9.00	11.00	9.00	
Huntington, Ind.	12.50@14.50	10.00	9.00		9.00	11.00	9.00	
Luckey, Ohio (f)	12.50							
Marblehead, Ohio		10.00	9.00				9.00	1.50c
Marion, Ohio		10.00	9.00				9.00	1.70
Mitchell, Ind.		12.00	12.00	12.00	11.00		10.00	1.70e
Sheboygan, Wis.							8.50t	
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50							
Woodville, Ohio (f)	12.50	10.00	9.00	12.50	9.00	10.50	9.00	1.50
SOUTHERN:								
Erin, Tenn.							7.80	1.25
El Paso, Texas							9.00	2.00
Graystone & Wilmay, Ala.	12.50	11.00		8.50			8.50	1.50
Karo, Va.		10.00	9.00				7.00g	1.65h
Knoxville, Tenn.	20.00	11.00		11.00		1.35	8.50	1.50
Varnons, Ala. (f)		10.00p	10.00p				8.00q	1.40r
Zuber and Ocala, Fla.	14.00	12.00	10.00				12.00	1.70
WESTERN:								
Kirtland, N. M.							15.00	
San Francisco, Calif.	20.00†	20.00†	15.00s	20.00†				2.50o
Tehachapi, Calif.							16.20	

†50-lb. paper bags; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) wood bbl., $2.20 drum in steel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 180 lb. bbl.; 265, 280 lb. bbl.; (l) bags; (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium; (p) to 11.00; (q) to 8.50; (r) to 1.50; (s) in 125-lb. burlap sacks; (t) in bbls.

Miscellaneous Sands

(Continued)

Molding coarse	1.25@	1.75
Roofing sand		1.75
Sand blast	3.50@	4.50
Stone sawing	1.25@	2.25
Traction		1.25
Brass molding	2.00@	3.00
San Francisco, Calif:		
(Washed and dried)—Core, sand blast and brass molding	3.50@	5.00
Furnace lining and roofing sand	3 50@	4.50
Molding fine and traction		3.50
Molding coarse		4.50
(Direct from pit)—Core and molding fine	2.50@	4.50
Sewanee, Tenn.:		
Molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding		1.25
Tamms, Ill.:		
Ground silica per ton in carloads	20.00@	31.00
Thayers, Penn.:		
Core		2.00
Molding fine and coarse		1.25
Traction		2.25
Utica, Ill.:		
Core and furnace lining		.70
Molding fine		.60
Molding coarse		.65
Utica, Penn.:		
Core		2.00
Molding fine and coarse		1.75
Warwick, Ohio.:		
Core, molding coarse (green) 2.00; (dry) 2.50; traction		2.50
Zanesville, Ohio:		
Core, molding coarse, brass molding		2.25
Furnace lining		2.00
Traction		2.50
Molding fine		2.75

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:		
Crude talc (mine run)	3.00@	4.00
Ground talc (20-50 mesh), bags		10.00
Cubes		55.00
Blanks (per lb.)		.08
Pencils and steel workers' crayons, per gross		1.25
Chatsworth, Ga.:		
Crude	4.50@	6.00
Ground (20-50 mesh) bags		6.00
Ground (150-200 mesh) bags	8.00@	15.00
Pencils and steel workers crayons, per gross	1.25@	2.50
Chester, Vt.:		
Ground (150-200 mesh); bulk	9.00@	10.00
Bags	10.00@	11.00
(Bags extra, returnable)		
Chicago, Ill.:		
Ground (150-200 mesh) bags		30.00
E. Granville, Rochester, Johnson, Waterbury, Vt.:		
Ground talc (20-50 mesh) bags	7.00@	10.00
Ground talc (150-200 mesh) bags	10.00@	25.00
Pencils and steel workers' crayons, per gross	.75@	2.00
Emeryville, N. Y.:		
(Double air floated) including bags; 325 mesh (50 lb. paper, 100 & 200 lb. burlap bags)		14.75
Hailesboro, N. Y.:		
Ground (150-200 mesh) bags		18.00
Ground (200-300 mesh) bags		20.00
Henry, Va.:		
Crude talc (mine run) per 2000-lb. ton	2.75@	3.50
Ground (150-200 mesh), bags	9.00@	14.00
Joliet, Ill.		
Ground (200 mesh), bags		30.00
Keeler, Calif.:		
Ground (200-300 mesh), bags	20.00@	30.00
Marshall, N. C.:		
Crude	4.00@	8.00
Ground (20-50 mesh), bags extra	6.50@	8.50
Ground (150-200 mesh), bags	8.00@	12.00
Natural Bridge, N. Y.:		
Ground talc (300-325 mesh), bags		13.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 68-72%	4.00@	5.00
Mt. Pleasant, Tenn.—B.P.L. 75%		6.50
75% hand mined		6.50
75% (free of fines for furnace use)	6.50@	6.75
75% max. 5½% I and A	6.50@	7.00
78% max. 4½% I and A		8.00
72% B.P.L.	5.50@	6.00
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.		5.50
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.00@	8.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12, 24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10, 18x10, 18x9, 18x12	12.60	11.00	8.70	8.75
16x10, 16x9, 16x8, 16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x8	11.10	10.50	8.10	7.80
14x7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

Ground Rock

(2000 lb.)

Centerville, Tenn.—B.P.L. 65%	7.00
Gordonsburg, Tenn.—B.P.L. 68-72%	4.00@ 5.00
Mt. Pleasant, Tenn. — B.P.L. 65% 95% thru 100 mesh	7.00
13% phosphorus, 95% thru 80 mesh	5.75
Twomey, Tenn.—B.P.L., 65%	7.00@ 8.00

Florida Phosphate

(Raw Land Pebble)

Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	2.25
70% min. B.P.L., Basis 70%	2.50
72% min. B.P.L., Basis 72%	2.75
75/74% B.P.L., Basis 75%	3.75

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	18.00@19.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	19.00@20.00
Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per gross ton	18.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars		10.50
Brandon, Vt.—American Botticino	9.00‡	9.00‡
Coral pink	9.00‡	9.00‡
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Crown Point, N. Y.—Mica Spar		8.00@10.00
Easton, Penn., and Phillipsburg, N. J.—Green granite	16.00@20.00	9.00@15.00
Talc		9.00@11.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio (in bags)		4.00@18.00
Middlebrook, Mo.—Red		20.00@25.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Poultney, Vt.		6.12
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Cal. — "Nat-rock" roofing grits		12.00
Tuckahoe, N. Y.		12.00
Villa Grove, Colo.		13.00
Wauwatosa, Wis.		16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. Less than C. L., 15.50.
‡Plus 2.00 per ton for bags.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	28.00@35.00
Baltimore, Md. (Del. according to quantity)	16.00@16.50	22.00@50.00
Ensley, Ala. ("Slag-tex")	12.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Milwaukee, Wis.	14.00	30.00@42.00
Omaha, Neb.	18.00	30.00@40.00
Philadelphia, Penn.	15.25	21.50
Portland, Ore.	19.00	25.00@45.00
Prairie du Chien, Wis.	14.00	25.00@32.00
Puyallup, Wash.	20.00	30.00@90.00
Rapid City, S. D.	18.00	25.00@45.00
Salem, Ore.	23.00	90.00@100.00
Watertown, N. Y.	18.00@21.00	35.00@37.50
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	14.00@15.50
Brighton, N. Y.	16.75
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich.	12.00
Hartford, Conn.	14.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00
Plant City, Fla.	11.00@15.00
Portage, Wis.	15.00
Rochester, N. Y. (del. on job)	19.75
Saginaw, Mich.	13.00
San Antonio, Texas	13.00@13.50
Syracuse, N. Y.	*18.00
Washington, D. C.	14.50
Wilkinson, Fla. (white and buff)	11.00@16.00

*Mill price, $20.00 delivered.

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, per ton Finishing	Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Boston, Mass.	20.00	14.00@15.00
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	....
Dallas, Tex.	20.00	——
Denver, Colo.	24.00	....
Detroit, Mich.	15.50	15.50
Kansas City, Mo.	19.50	18.50
Los Angeles, Calif.	18.00	....
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	....	21.00
New Orleans, La.	24.50	17.00
New York, N. Y.	18.20	12.00@13.10
Philadelphia, Penn.	23.00	16.00
St. Louis, Mo.	24.00	20.00
San Francisco, Calif.	22.00	....
Seattle, Wash. (paper sacks)	24.00	——

Portland Cement

Prices per bag and per bbl. without bags net in carload lots.

	Per Bag	Per Bbl.
Boston, Mass.	.63	2.53@2.63
Buffalo, N. Y.	.60	2.38@2.48†
Cedar Rapids, Iowa	....	2.44
Cincinnati, Ohio	....	2.47
Cleveland, Ohio	....	2.39
Chicago, Ill.	....	2.20
Columbus, Ohio	....	2.44
Dallas, Texas	.53¾	2.15
Davenport, Iowa	....	2.39
Dayton, Ohio	....	2.48
Denver, Colo.	.63¾	2.55
Detroit, Mich.	....	2.25
Duluth, Minn.	....	2.19
Indianapolis, Ind.	....	2.41
Kansas City, Mo.	.51¾	2.07
Los Angeles, Cal. (less 5c dis.)	.60	2.60
Louisville, Ky.	....	2.45
Memphis, Tenn.	....	2.60
Milwaukee, Wis.	....	2.25
Minneapolis, Minn.	....	2.42
Montreal, Que.	....	1.90
New York, N. Y.	....	2.15@2.25
Philadelphia, Penn.	.58	2.31@2.41
Pittsburgh, Penn.	....	2.19
San Francisco, Calif.	.65¼	2.71*
St. Louis, Mo.	.57½	2.30
St. Paul, Minn.	....	2.42
Seattle, Wash. (10c bbl. dis.)	....	2.65
Toledo, Ohio	....	2.40

NOTE—Add 40c per bbl. for bags.
*Including sacks at 10c each.
†Prices to contractors, including bags.
(a) Less 10c 20 days.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	....	1.95
Concrete, Wash.	....	2.35
Dallas, Texas	.52½	2.50*
Hannibal, Mo.	....	2.05
Hudson, N. Y.	....	2.05
Leeds, Ala.	....	1.95
Nazareth, Penn.	....	1.95
Northampton, Penn.	....	1.95

*Including sacks at 10c each.

Cement Products

Hawthorne tile, carload lots, f. o. b. plant.

	Cicero, Ill. Per sq.	Ft. Worth, Tex. Per sq.
Silver gray	......	8.00
Red French	9.50	9.00
Green French	11.50	10.00
Red Spanish	10.00	9.00
Green Spanish	12.00	10.00

	Cicero		Ft. Worth		
	Red	Green	Gray	Red	Green
Ridges	.25	.35	.25	.25	.30
Hips	.20	.30	.14	.14	.17
Ridge closers	.05	.06	.06	.06	.06
Hip terminals, 3 way	1.25	1.50	1.00	1.00	1.25
Hip starters	.50	.60	.22	.22	.25
Gable finials	1.25	1.50	1.00	1.00	1.25
Gable starters	.20	.30	.14	.14	.16
End bands	.20	.30	....	....	—
Eave closers	.06	.08	.06	.06	.06

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agri-cultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board ¼x32x36". Wt. 1500 lb. Per M Sq. Ft.	Plaster Board ⅜x32x36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Centerville, Iowa	3.00	4.00	8.00	7.00	10.00	9.50	10.00	....	25.80	11.00	....	....	....
Douglas, Ariz.	....	....	7.00	....	16.50	....	19.50	....	....	15.50	....	....	....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	....	26.55	20.00	....	....	....
Gypsum, Ohio‡	3.00	4.00	6.00	9.00	9.00	9.00	18.00	7.00	30.15	20.00	....	20.00	30.00
Hanover, Mont.	....	....	....	11.80	....	....	....	....	....	....	....	....	....
Los Angeles, Calif.	....	....	....	10.50	....	....	12.30	....	....	....	....	....	....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	....	20.00	30.00
Portland, Colo.	....	....	....	10.00	....	....	....	....	....	....	....	....	....
Sigurd, Utah	....	....	....	....	....	....	....	....	18.00a	....	....	....	....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	....	....	....	....	28.50	....	34.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 21.00.

New Machinery and Equipment

New Wire Rope for Quarry Use

OF INTEREST to quarrymen is the announcement by the American Cable Co., New York City, of a new wire rope, known as "Tru-lay," embodying in its construction what is claimed to be a basic improvement over previous methods of manufacture.

The new principle developed in the making of the rope is the pre-forming of wires and strands to the exact shape they must have to fit correctly in the completed product. The rope is being made in Lang and regular lays up to 1-in. in diameter and engineers concerned with its development for mining purposes are said to express satisfaction with its performance under exacting and strenuous tests.

An important characteristic claimed for "Tru-lay" rope is that it resists unstranding. It can be cut at any point for splicing and otherwise handled without the necessity of seizing. Exhaustive tests are said to show that it has considerably longer life than ordinary rope under reversed bending stresses—an important asset where winding over sheaves and drums is a chief cause of wear.

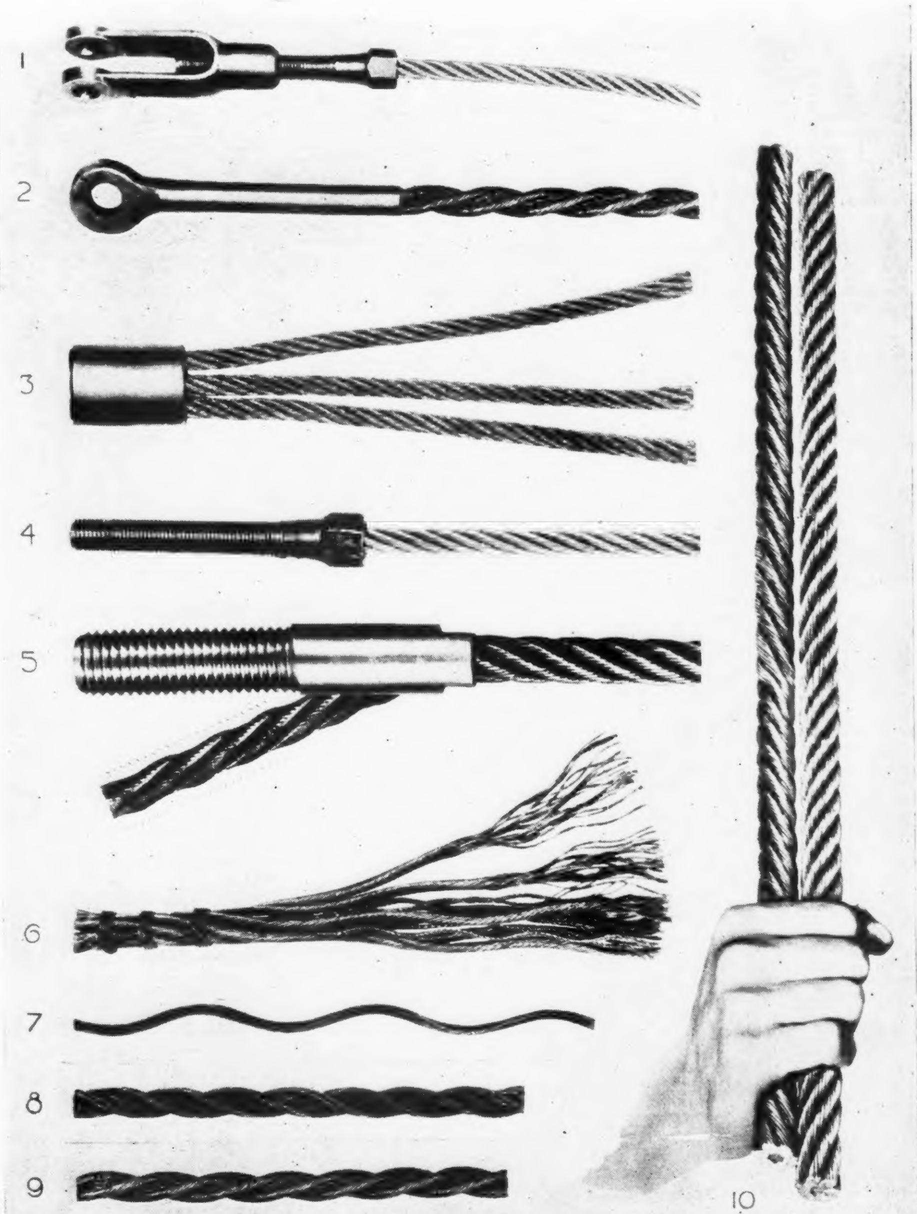
The pre-forming of the wires and strands in the rope results in evenly balancing the load on individual strands and in a remarkably uniform load distribution to single wires. It is said that the rope shows no tendency to high strand in actual use and has stood up satisfactorily in winding tests under heavy loads.

Broken wires in this new rope lie flat. Outer wires on cables, broken by long wear or abrasion, cause considerable trouble, and often necessitate the removal of the rope before it should actually be discarded. The outer wires of the "Tru-lay" rope, it is claimed, show no tendency to fray out of the rope body. They continue in their places, thus lessening the wear on other wires and on sheaves and drums.

Rope users have long known that Lang-lay rope has advantages over regular lay for certain sheave and drum work. While 80% of mine cable used in England and Europe is Lang-lay, it has been little used in the United States because of difficulties in splicing and handling. The pre-formed principle in "Tru-lay" rope is designed to meet this difficulty, making use of Lang-lay rope possible wherever desired.

To make available practically the entire strength of the new rope, the American Cable Co. has developed for it a special steel fitting, without zinc, called "Tru-loc." The "Tru-loc" fitting has, it is claimed, not only proved dependable under ordinary conditions but also permits the use of turnbuckles, shackles and other equipment used with roads and chains.

A steel sleeve is slipped over the smooth unseized end of the rope, placed in a specially designed press, and made to "flow" down upon the rope until it grips wires and strands. These sleeves may be of any reasonable length—can be threaded, can be equipped with heads of various types for wrenches, or furnished with eyes or hooks.



(1) Rope with a threaded hexagon fitting permitting the application of shackle as shown, or turnbuckles, rods, etc. (2) Flat head eye end fitted directly to rope. (3) Example of a multiple rope fitting. Any reasonable number of ropes can be fitted in this fashion. (4) Hexagon fitting which makes wire rope as adaptable to various uses as rods. (5) Steel fitting split open to show how metal grips strands and wires in the rope. Better equalization of load on wires and strands is made possible through the use of this type of fitting. (6) How an ordinary wire rope unstrands when cut. (7) Strand of wire. Note how the strand is preformed to hold the exact shape it must take in the completed rope. (8) Perfect balance of strands is obtained in rope of regular lay made on the principle. Illustration shows length of rope with every other strand removed. (9) Length of Lang-lay rope with every other strand removed. Although unseized the rope does not unstrand. (10) Graphic illustration of how new rope can be cut and handled without seizing and without loss of shape

The fitting is lighter, less bulky and has been found to be more dependable than the old-style zinc socket, probably because of the greater equalization of load on wires and strands.

"Tru-lay" rope is designed for use in every industry where wire rope is a factor. It is now being introduced into the Mid-continent oil drilling fields, in the general building and construction field and in the cement and quarrying field.

Important Gyratory Crusher Patent Decision

A SUIT claiming an infringement of their patent on certain features of a gyratory crusher design has been won by the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., as successors to the Worthington Pump and Machinery Corporation's Power and Mining Division, Cudahy, Wis., against the Traylor Engineering and Manufacturing Co., Allentown, Penn.

The patent covers certain features of the "Superior McCully" gyratory crusher which are held to be infringed by the "Traylor Bulldog" crusher. The case was finally decided on March 23 against the Traylor Engineering and Manufacturing Co.

The Traylor Engineering and Manufacturing Co. have replied to this by stating that the "Traylor Bulldog" crusher which they now have on the market is different from the crusher which was held to be an infringement in the suit brought by the Worthington Pump and Machinery Corp. and does not infringe the "Superior McCully" crusher patents. Moreover the "Bulldog" crusher embodies certain special features that are fully covered by patents.

Lever Control for Shovels

THE "feather-touch" lever control, developed and perfected by the Northwest Engineering Co., and put on all their machines beginning with June, 1924, has now had sufficient amount of testing, it is claimed, to prove that it is an improvement in the handling of the excavating machine of the type this concern builds.

The "feather-touch" lever control is a clutch shifting device through which the engine does the heavy work of shifting the clutches, eliminating 80% of the effort ordinarily required.

The following description may be understood from the pictures:

The operator, when engaging the clutch moves reach rod A upward by pressure on the hand lever, thus moving swinging rocker B upward. This pulls down on end C of the band. The drum revolving to the left naturally moves the band in this direction which draws crank B to the right. Both E and G are keyed to the shaft and therefore G moves with it and through toggles, thrusts shifter rod H inward, thus throwing the cltuch. The action of the lever control itself is instantaneous and the little band is in contact with the drum but a fraction of a second. It does not drag and is free from the danger of heating up. Further this is the type of control to which the operator has become accustomed. The clutch is thrown by the center and the operator can feel his way. After the clutch is thrown, no further hand pressure is required, and the operator can take his hand off the lever.

The Northwest Engineering Co. says that it was not satisfied to put this device on their machines until absolute safety was assured by a positive release.

It further says: "It was easy to design a power clutch control that merely moved the clutch in and gripped the revolving drum, but it was not so simple to introduce into it the element of positive release and freedom from wear.

"The 'feather-touch' lever control has a positive release. By means of the hand lever, reach rod A is moved downward, swinging rocker B downward. This brings lug L in contact with set screw M of rocker lever E. As E and G are keyed to the same shaft, the movement of E upward swings G downward thus pulling out reach rod H by means of simple toggling. Thus the release is done by the operator and in no way is the part of the band and drum. This design eliminates all danger of hoisting the load through the boom. The device is extremely sensitive and there is very little movement on the part of any one of the parts, thus long life is assured."

New Barriers on Celite Shield

THE trade mark of the Celite Products Co., Los Angeles, Calif., consists of a shield upon which is reproduced a wall, suggestive of the walls that surrounded medieval castles.

The company has just announced the changing of this shield to accommodate two new products which have been placed on the market in the past year, namely, "Super-Cel," a new grade of material for filtering liquids and "Celite for Concrete," used as an admixture to concrete to increase its workability and increase its uniformity.

Illustrating new "feather touch" lever control for gasoline-shovel control

South Dakota Develops New Way to Push Cement Sales

THE gospel of loyalty to South Dakota's state cement plant will be preached throughout the state this month by the three members of the state tax commission, who are visiting every county in the state to hold "short courses" with township assessors to instruct them in their annual duties of property assessment.

At the request of Gov. Carl Gunderson the tax commissioners will put before the assessors at each county meeting the case of the state cement plant, urging the assessors to carry to the farmers and business men of their townships, as they make the rounds in their assessment duties, a plea for support of the state plant and for use of its product in private building and in public works. The governor states:

"The tax commissioners will try to bring to residents of the state the truth that the success of the plant, involving more than $2,000,000 in state funds, is dependent not alone nor principally upon the cement commission nor the plant management, but upon the support and endorsement in a material way of the plant which they themselves have authorized and set up."—*Sioux Falls (S. D.) Argus-Leader.*

State-Made Cement Must Be Used for Highways

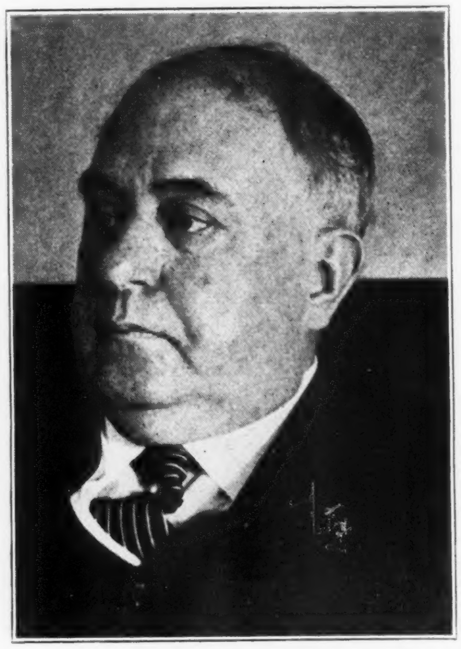
IN preparing plans and specifications for highway work, the South Dakota state highway commission now requires the use of state-made cement, and notice has been sent out to all contractors to that effect in the following communication:

"The standard specifications for road and bridge work on state trunk highways, issued February 1920, item 264, page 50, should therefore read as follows:

" 'Cement shall be Dakotah Portland cement from the state cement plant at Rapid City, South Dakota, which will conform to the requirements of the U. S. Bureau of Standards, Circular No. 33.' "

Death of C. G. Buchanan

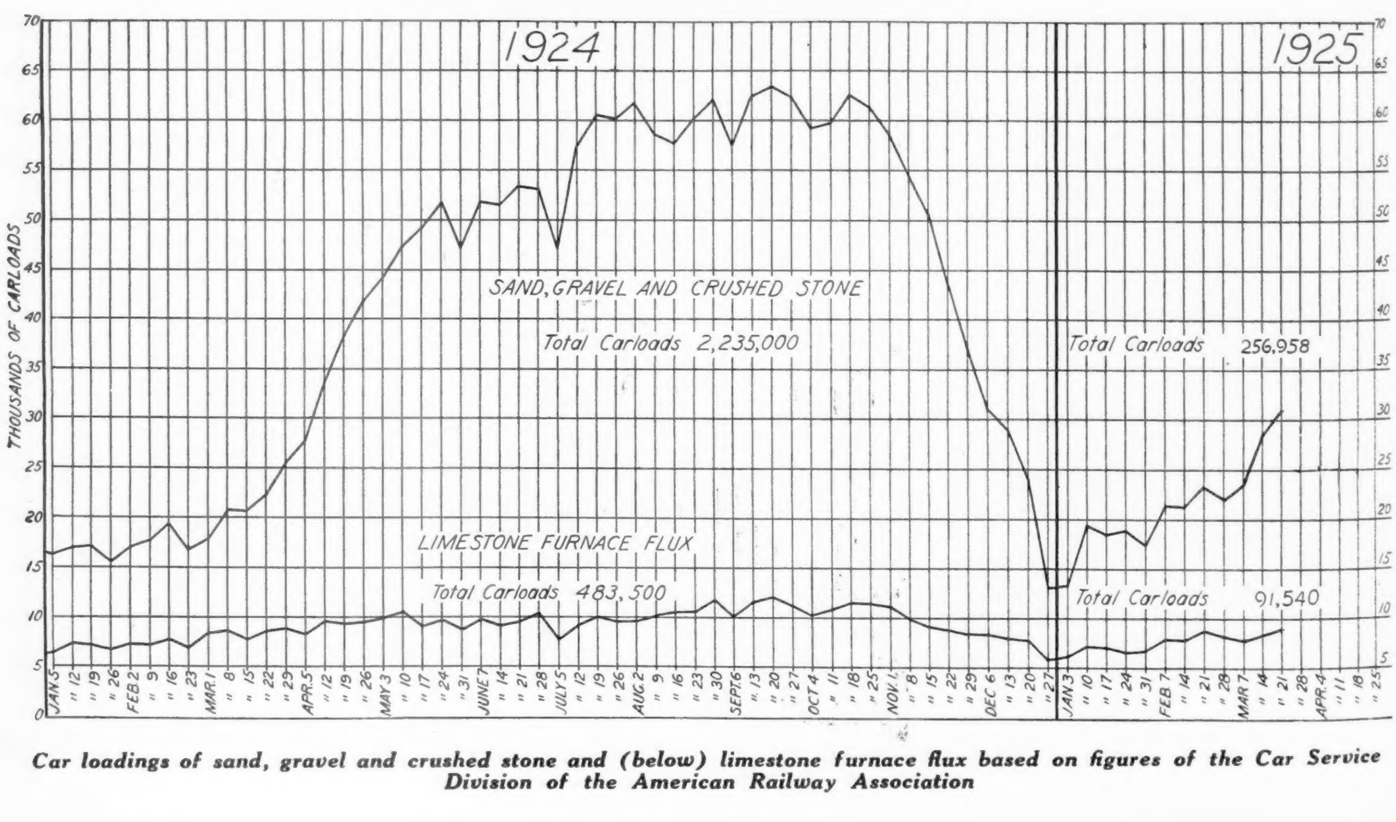
C. G. BUCHANAN, president of the C. G. Buchanan Co., 90 West Street, New York City, among the oldest and best known manufacturers of jaw crushers, crushing rolls and other quarry and mine machinery, died April 9, at his home in East Orange, N. J., aged 69 years. He was a member of the American Society of Mechanical Engineers, the Institute of Mining and Metallurgical Engineers and other scientific and engineering societies. He was a recognized expert in his specialties. He took a prominent part in the organization of the Manufacturers' Division of the National Crushed Stone Association and was its vice-chairman at the time of his death. He had been in failing health for some months past and was unable to attend the recent convention of the crushed stone industry at Cincinnati. He is survived by a son, Gordon Buchanan, who has long been associated with his father in business, and under whose direction the business will be continued. C. G. Buchanan was also consulting engineer for the Birdsboro Steel Foundry and Machine Co., Birdsboro, Penn.



C. G. Buchanan, president and founder of the C. G. Buchanan Co.

Lots of "Pep" in Starting

PRODUCERS of crushed stone, sand and gravel need have no worries about consumption and demand, if the pace indicated by the chart below is maintained. The movement of these materials by the railways is very considerably more than for the same period a year ago. The 20,000-a-week mark was not passed until the week of March 1 in 1924; this year the week of January 31. The 30,000-a-week point reached the week of April 5 a year ago was reached the week of March 14 this year. The flux stone business could be better, but it is somewhat ahead of last year.



Car loadings of sand, gravel and crushed stone and (below) limestone furnace flux based on figures of the Car Service Division of the American Railway Association

March Building Sets New Record

MARCH building operations showed an increase of 11% over the corresponding month of last year, according to F. W. Dodge Corporation. Building contracts awarded last month in the 36 Eastern States (which include about seven-eights of the total construction volume of the country) amounted to $480,916,300, compared with $433,340,300 in March, 19224. The increase over February of this year was 61%.

The most conspicuous feature of the March record was the contract for a $30,000,000 electric power development in West Virginia. In fact this one project accounted for most of the increase over the previous March. This project brought the total of industrial work for the month up to $53,133,000, or 11% of all new construction started during the month. Public works and utilities project continue to increase. Last month they amounted to $67,931,000, or 14% of the total. Educational buildings amounting to $42,192,900, or 9% of the total, also increased over last March. Residential buildings, although amounting to 46% of last month's total, or $220,872,100 fell behind the previous March; and commercial buildings fell behind, too, amounting to $54,871,100, or 11% of the total.

Total construction started during the first quarter of this year has amounted to $1,076,569,300, an increase of 4% over the first quarter of last year. The New York State and Northern New Jersey territory has shown a decrease of 32%; the Northwestern States, a decrease of 8%; all the other districts show substantial increases. In fact, the territory outside of New York City shows a general increase of 21% over the first quarter of 1924.

Contemplated new work reported in March amounted to $770,301,800, which was a considerable increase over the previous month and also over the previous March.

Tenth Exposition of Chemical Industries

THE growing importance of the chemical industry to the economic life of the nation will be emphasized at the Tenth Exposition of the Chemical Industries to be held during the week of September 28 to October 3 at the Grand Central Palace, New York City. Plans are under way to have this exposition embody the essential features of the present status of the industry. One of the features of the exhibition will be the display of those achievements related to the chemical industry, deemed meritorious, whether in pure research or industrial research fields, grouped in the form of small unit exhibits into a specially arranged "Court of Chemical Achievements."

The management of the exposition will be glad to give details of any of its work in which readers are interested.

Gypsum Plant May Be Built at Okeene, Oklahoma

A NEW industry for Okeene, Okla., a gypsum plant for the manufacture of plaster and gypsum products, practically is assured, according to George F. Dusbabek who has been in consultation with a group of Kansas capitalists.

The capitalists asked that Okeene furnish a site for the plant and this has been arranged.

Under the terms of the agreement more than $1,000,000 will be expended in the construction of the main buildings and equipment, and in addition fifty dwelling houses will be erected for the ocucpancy of employes. The plant will be more than three times as large as the one now in operation at Southard, the contract specifying twenty-four 6 ft. kettles or twelve 12 ft. kettles, modern in all its equipment and the use of a process whereby all dust and smoke will be eliminated.—*Enid (Okla.) News.*

News dispatches in other local papers state that the company to build the plant is the Acme Cement Plaster Co., now part of the Certainteed Products Corporation.

Plans for Organization of "The American Refractories Institute"

IT is announced that tentative plans have been made for the organization of a bureau to be named "The American Refractories Institute." One of the main purposes of this institute will be to provide a satisfactory means for contact between representatives from all the industries that use and manufacture refractories, in order that their various economic and technical problems with respect to heat-resisting materials may be thoroughly considered and that efforts may be made for the solution of these problems.

According to the announcement, it is proposed to maintain a research laboratory wherein outstanding problems will be studied. These problems will be those of the consumer as well as those of the manufacturer.

It is generally conceded that there is a real need for an organized establishment of the type of the proposed institute. It is therefore pleasing to learn that there is every indication that the project will receive the joint whole-hearted co-operation of consumers and manufacturers of refractories. Endorsement of the undertaking has in fact been given by a large number of men in the field of refractories technology. This interest has been manifested by applications for membership from a considerable number of industrial executives. The organizing committee of the institute is now inviting the especial attention of men who use refractories, in accordance with the fundamental idea of making the institute a service bureau for consumers as well as for producers of refractories. The membership dues will be nominal, inasmuch as it will be necessary to provide for only the actual operating expenses of the institute.

The first meeting of the American Refractories Institute was held on April 14 at the Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh, Penn.

Following a short business session a number of speeches were made, including an address on "The Value of Research in Industry," by Dr. E. R. Weidlein; a practical discussion of "The Use of Refractories Materials," by H. L. Dixon; an address on "Refractories Accounting," by A. J. Farber; a discussion of "Spalling," by M. C. Booze; a discussion of "Relation of Structure and Composition of Refractories to Thermal Efficiency in Regenerators," by S. M. Phelps, and an address on "The American Refractories Institute," by J. D. Ramsay.

$2,000,000 Cash Paid for Nevada Gypsum Deposit

PAYING a cash consideration of $2,000,000, C. F. DeWitt, John H. Blair and C. E. Rachal of Los Angeles, Calif., announced the purchase of a 640-acre gypsum deposit located at Arden, Nev.

The Los Angeles men bought the mineral land from J. H. Eaton, a mining engineer. Figures show that the gypsum bed is 85 ft. wide, one mile long and one mile deep.—*Los Angeles (Calif.) Examiner.*

Crushed Slag Plant at Swedeland, Penn., Rebuilt

THE rejuvenation of the slag crushing plant of the Philadelphia Slag Co. at Swedeland, Penn., has been completed at a cost of $300,000. The plant is now equipped with the most modern machinery and produces crushed slag in all sizes from grit to ballast and also "Buckite," a bituminous concrete using dolomite slag aggregate.

In an interview with a correspondent for the *Norristown (Penn.) Times-Herald,* William S. Buckland, president, stated:

"For the last nineteen years the Philadelphia Slag Co. has operated a slag crushing plant at Swedeland, and has produced slag in all of the various sizes, from grit to ballast. Each succeeding year has brought forth more and more uses for slag, as both structural and road-building engineers have come to appreciate its merits through actual tests covering long periods of time. Dolomite slag has been used in England as the mineral aggregate in road-building material for years and has proven to be far more durable than any other substance available for a bituminous mix. After a thorough research was made, and road-building engineers of both continents were consulted, the Philadelphia Slag Co. decided to make a quantity of such mix, using the Swedeland dolomite slag combined with the highest grade of asphalt obtainable."

The result was Buckite as now produced. The capacity of the Swedeland plant for both products is 5000 tons daily.

News of All the Industry

Incorporations

A. Dupu, quarry, Montreal, Que., registered.

Montreal Crushed Stone Co., Montreal, Que., registered.

La Carriere Rauthier-Cyr Quarry, Broughton, Que., registered.

J. E. Gauthier, Montreal, Que., has been registered to manufacture cement products.

Pacific Stone Co., Seattle, Wash., capital stock $50,000 by Ira L. Bronson and E. W. Parks.

Barela Quarries, Inc., New Haven, Conn., $100,000. Jos. Barone, 16 Ellsworth avenue and others.

Ajax Concrete Products Co., Cumberland, Md., capital $50,000, by Harry D. Airesman and John E. Legge.

Dominion Silica Products, Ltd., Ottawa, Ont., capital $40,000. Will quarry and deal in stone, sand and gravel.

Windmill Point Crushed Stone Co., Ltd., Toronto, Ont., capital $200,000, to quarry and deal in all classes of stone.

B. C. Richards Stone Co., Kerrville, Texas, capital stock $5000, by B. C., Mrs. Henrietta and F. F. Richards.

Downing Sand and Gravel Co., New York City, $25,000; R. E. Downing and A. Blumberg. (Attorney, W. J. Oliver, 220 Broadway.)

Gypsum Corporation of America, Wilmington, Del., capital $5,000,000, to mine gypsum and other minerals. (Delaware Charter Co.)

Barrett Paving Co., Trenton Trust building, Trenton, N. J., capital $100,000, manufacture lime, cement, plaster and paving materials.

Hercules Cast Stone Corporation, Revere, Mass., capital $15,000. President, Wallace J. Wood; treasurer, Geo. F. Paine and Joseph E. Cahill.

Roland C. Griffin and Frank L. Gautier have engaged in business at 6400 Lankershim Blvd., Lankershim, Calif., as Producers Rock Products Co.

Union Portland Cement Co., Denver, Colo., has filed an amendment to its articles of incorporation decreasing its capital stock from $2,500,000 to $1000.

Brilliant Sand Co., Brilliant, Ohio, $50,000, W. J. Hukill and George B. Clifford, Christine A. Messersmith, John W. Driskill and Wm. A. Fisher.

U. S. Concrete Products Corporation, Gary, Ind., capital stock of $25,000. The directors are: Otto McMurray, Ethel McMurray and A. P. Draper.

Snagg Sand and Gravel Co., Inc., Waterbury, Conn., authorized capital of $50,000, to begin with $6500. Incorporated by A. R. Snagg, J. E. Pilkington and William Burns, all of Waterbury.

Hot Springs Concrete Co., Hot Springs, Ark., by L. T. Smith and associates. The company will operate a quarry and sell crushed rock and ready mixed concrete and do concrete contracting.

Richmond Sand and Gravel Co., Petersburg, Va., has had its charter amended increasing its maximum capital stock from $150,000 to $500,000 and decreasing its minimum stock from $35,000 to $5000.

Mid-Continental Portland Cement Co., incorporated in Delaware with a capital of $11,000,000. Charles E. Bishop, E. H. Feustel and A. S. Bishop of Wilmington, Del., are named in the document.

Duntile Manufacturing and Supply Co., Camden, N. J., 1000 shares no par. Incorporated by Earl R. Zimmerman, Camden; Frederick H. Straub and Everett E. Zimmerman, Philadelphia. (Attorney, Herbert Richardson, Camden.)

United Materials Co., 133 West Washington street, Chicago, capital 1000 shares no par value. Will produce and deal in sand, gravel, crushed stone, cement products and other building materials. Incorporators, Ruth and Earl Cohler and Harry E. Weis.

Gibbons and Griffith Co., 111 West Washington street, Chicago, capital $100,000, to produce sand, gravel, crushed stone, silica sand and other minerals. Incorporators: John P. Gibbons, Richard Considine, Thomas Griffin. (Attorney, John Gutknecht, suite 1609-11, Conway bldg.)

Atlantic Cement Products Corporation, Boston, Mass., capital $20,000, with 800 shares preferred at $25 each and 800 shares common no par. President, Raymond C. Eggleton; treasurer, Forrest E. Freeman, 164 Oakley road, and Ethel V. Freeman.

Cambridge Cement Stone Co., Boston, Mass., capital $200,000, with 2000 shares preferred at $100 and 2000 shares common no par. President, Paul A. Mazzuchelli; treasurer, Virgini E. Mazzuchelli, 121 East Cottage street, Dorchester, and Leo S. Hamburger.

Sand and Gravel

Hubbell Sand Co., Manistee, Mich., has secured a large acreage of beach sand lands in Grant township.

Glasgow Sand Co., Glasgow, Mo., is reported to be enlarging its plant. A. E. Fisher is general manager.

G. P. Scharl is installing a screening plant at his gravel pit two miles south of Saranac, Mich., preparatory to re-opening it.

The Leland gravel pit, west of Syracuse, Ind., has been opened and about 15 cars of building sand are being produced daily, when in full operation the plant will put out twice that quantity.

Waverly Gravel and Tile Co., Waverly, Iowa, is erecting bins and a screening plant at its sand and gravel plant preparatory to opening up the season on a larger scale. D. A. Mether is manager.

Southern Material and Construction Co., Little Rock, Ark., has leased a number of sand and gravel bars in the Mississippi river near Hickman, Ky., and will establish a branch plant there.

Millard L. Hamor has entered into a contract with the town of Bar Harbor, Me., which provides that the town shall pay him 15 cents per yard for all gravel taken from his pit at Hulls Cove for a period of five years. Crushing and screening equipment is now being installed at the pit.

Osage Gravel Co., Bagnell, Mo., is negotiating to purchase a 65 ft. boat equipped with 60-h.p. oil engines and two additional barges to use in its operations in the Osage river. The company has already completed two new barges and is rumored to have a contract to furnish gravel for the dam which the Hydro-Electric Power Co. plans to build four miles from Bagnell.

The Halkey gravel pit near Welcome, Minn., was purchased by the state of Minnesota for $6083. After listening to evidence, arguments and instructions for three days and spending several hours talking it over themselves, a jury awarded this amount. It is estimated there are 90,000 yards of gravel in the pit. "I think the state has got nearly $30,000 worth of the best gravel in the world for $6083, but I shall, of course, be satisfied with the verdict of 12 of my neighbors and friends," said Mr. Halkey.

Quarries

City of Knoxville, Tenn., is erecting a rock crushing plant at the city quarry.

Sullivan Granite and Construction Co., New Bedford, Mass., will open a new quarry at Bradford, Mass., in the near future.

Builders' Crushed Rock Co., Covina, Calif., has been awarded the contract on all the crushed rock to be used in building the dam in Santa Anita Canyon. The contract calls for the use of about 100,000 tons of rock.

L. D. Smith Stone Co., Sturgeon Bay, Wis., has closed a contract to furnish 20,000 tons of crushed rock at Kenosha for road work. The company plans to secure dock property and open a retail yard there.

A rock crusher is being installed at the quarry at Lake Murer, near Excelsior Springs, Mo., preparatory to opening the quarry to produce crushed stone for Missouri highway construction. James Cahill is in charge of the work.

Good Stone Quarry Co., Conowingo, Del., was awarded $17,500 for the title for land for the proposed hydro-electric plant of the Susquehanna Power Co., by a jury in condemnation proceedings brought by the power company.

Michigan Limestone and Chemical Co., Buffalo, N. Y., has been co-operating with the Venango county (Penn.) Co-operative Buying Association, in showing a series of motion pictures in that county illustrating the uses of limestone.

Mark and J. Hein have leased the Lauritzen quarry, two miles south of Petaluma, Calif., and will spend about $70,000 for new machinery, opening the quarry and improving the roads to the plant. They have also leased river and railroad track frontage.

Maxwell and Joyce, Kansas City, Mo., have purchased 110 acres of land at Stoutsville, Mo., and will spend $60,000 opening limestone quarries on the property. The quarries will produce crushed stone for the ballast for the Wabash railroad and for state highway construction, it is said.

Cement Products

S. J. Cantor contemplates building a concrete block factory in Sweetwater, a new subdivision of Miami, Fla.

H. B. Price is about to establish a plant just south of Marysville, Calif., for the manufacture of cement building blocks.

Lacey Peyton of Benton, Ill., has acquired property at Sixth and Trimble streets, Paducah, Ky., and will establish a concrete block plant.

Columbia Cement Co., of San Diego, Calif., is seeking a location on the tide lands of National City, Calif., for a plant to manufacture cement products.

Pittsburgh-Miami Finance Corporation, owners and developers of West Sweetwater, 12 miles west of Miami, Fla., are building a concrete block plant there to furnish blocks for a large building program.

Chick Contracting Co., Windsor, Ont., has installed a plant for the manufacture of concrete blocks. The equipment includes one press with all auxilliaries such as screens, crushers, mixers, elevators and bins.

The Concrete Products Co., Birmingham, Ala., is operating its plant at full capacity and manufacturing concrete fence posts, flower boxes and urns in connection with the regular line of roofing and building tiles.

Mrs. Kittie Graham, operating the cement pipe business left by her late husband at Lodi, Calif., secured a contract recently to supply and install cement pipe on a 4000-acre ranch near Sacramento, Calif.

Raymond Concrete Pile Co., Kansas City, Mo., has been awarded the contract for sinking 500 concrete piles for the new Creighton University stadium. The work will begin at once and cost approximately $18,000.

W. E. Williams has begun the operation of his cement block plant at 817 South Center street, Phoenix, Ariz. The plant represents an investment of about $7000 and has a floor space of 2125 sq. ft., is equipped with two cement block machines and has a capacity of 6000 blocks per day.

The new cement block plant in the yard of the Kent county (Mich.) jail has started operation. Eleven prisoners are employed and are to be paid 25 cents per day. The initial capacity of the plant was 500 blocks but will be increased to 1500 blocks per day when all machinery is installed.

Gulf Concrete Pipe Co., Houston, Texas, has added a cement roofing tile unit to its plant. The plant produces about $200,000 worth of cement products annually, making concrete pipe and building tile in various sizes and styles and now roofing tile. N. A. Eppes is president and general manager and Julian A. Westlow is secretary and treasurer of the company.

Houghten Cement Block Co., Detroit, Mich, has built a new plant at Devine and Gratiot avenues which will increase the company's output by 25 to 35%. A special feature of this plant is an elevated sand and gravel bin with a capacity of 60 cubic yards. Bucket elevators carry the aggregate from the piles to the bin where it is fed to the mixers by gravity.

Agricultural Limestone

M. G. Foss, near La Porte City, Iowa, has crushed over 175 tons of limestone for use on his farm this year. He also is supplying some of his neighboring farmers with the limestone.

Limestone crushers, numbering more than 125, are scattered over Wisconsin crushing limestone for the soil. Most of the machines are such that they are moved from place to place crushing the stone in lots of 100 to 300 tons each. A crusher owned by John Hotteshop has prepared over 5000 tons of agricultural limestone this year.

Magnesite

M. Parberry of Los Angeles, Calif., has purchased the magnesite deposits east of Lindsay, in Tulare county, from Samuel Baggs and the S. F. Coolidge estate, and will erect a plant and develop them.

Magnacrete Products Co., San Francisco, Calif., has leased the plant of the Pacific Alloy and Steel Co., at Bay Point, Calif., and will manufacture magnesite floor products, slabs and insulating building material.

Slag

Woodstock Slag Corporation, Birmingham, Ala., is installing another crusher and elevator in its plant at Woodward, Ala. This plant was completed only a few months ago and increased business has made necessary the enlargement of the plant.

Slate

Norwood and Eugene Hankee and Oscar Thomas, have leased the old Keystone slate quarry near Slatington, Penn., and will soon begin operation.

Manufacturers

Northern Conveyor and Manufacturing Co., Milwaukee, Wis., will move to its new fully equipped factory at Janesville, Wis., on or about June 1. The new plant will provide facilities for tripling the company's output.

Foote Bros. Gear and Machine Co., Chicago, recently completed arrangements for the representation of IXL speed reducers and gear products in Mexico by John A. Park, Gran Hotel, No. 12 Avenida Uraguqy, Mexico City.

Clyde Iron Works Sales Co., Duluth, Minn., has announced the removal of its New York office to East 136th street and Locust avenue, placing the office and warehouse in the same building and thereby facilitating service to customers.

Link-Belt Co., announces a price reduction on its type "C" portable bucket loader and its "Cub" portable belt conveyor. The price of these machines, complete with two or three phase, sixty-cycle, a. c. motor, is now $475, f. o. b. Chicago or Philadelphia.

Blaw-Knox Co., Blanox, Penn., has authorized Herbert C. Legg Co., Phoenix, Ariz., distributors for Blaw-Knox products and clamshell buckets for the state of Arizona. Irving Pfeil, formerly connected with the company's Chicago and Detroit offices, is now located in the New York sales office.

Foote Bros. Gear and Machine Co., Chicago, has opened a new sales office in Providence, R. I., to handle business throughout the New England states. The office is in charge of George Walsh and is located at 72 Ontario street. The company also announces Frank P. Callaghan, chief engineer, has left for Cuba to take care of some engineering work there.

Harnischfeger Corporation, Milwaukee, Wis., (formerly Pawling and Harnischfeger Co.) announce the location of a new branch office at Birmingham, Ala. James Van Buskirk has been transferred from the company's Detroit office to take charge of this office at 431 First National Bank building. H. E. Mensch has been placed in charge of the Detroit office at 452 Book bldg.

Personals

George S. Heffran has been named manager of the Woodlawn, Penn., plant of the Ohio River Sand Co.

George Yeocum has taken over the managership of the plant of the Union Cast Stone Co. at Davenport, Iowa.

J. W. Vorhis has accepted the position of superintendent and general manager for Bauer, Johnson and Co., Quincy, Ill.

H. W. Hardinge, president of the Hardinge Co., Inc., York, Penn., having been abroad for the past few weeks on company business, has returned on the "Olympic," arriving April 15.

C. W. Ross, formerly with the Beaumont Co., is now manager of the Philadelphia office of the C. O. Bartlett and Snow Co. of Cleveland, Ohio. The Philadelphia office is at 807 Schaff bldg.

C. O. Dowdell, formerly field engineer, Central District, National Lime Association, has been appointed special western railroad representative of the Barber Asphalt Co., with headquarters at 1344 Union Trust Bldg., Chicago.

Horace H. Wood, Jr., research fellow in the Iowa Engineering Experiment Station, recently investigated the effect of mixing lime products with clay for road-making purposes at Ames, Iowa. He is acting in co-operation with the National Lime Association.

Major C. W. D. Rowe, who will be remembered by American lime manufacturers as a member of the 1924 convention of the National Lime Association, has been named representative for Arnold and Weigel in England. Major Rowe is managing director of the Dunstable Lime Co., Ltd. of Petersborough, England.

Major C. W. D. Rowe

G. S. Brown, president of the Alpha Portland Cement Co., is a member of the United States Chamber of Commerce Committee No. 6 on national distribution and recently attended a meeting of that committee, where plans were discussed for instituting an inquiry into the methods and cost of distribution and to assist distributors to study their own problems.

Trade Literature

Poole Engineering and Machine Co., Baltimore, Md., is issuing a new bulletin entitled, "Do You Know How Poole Gears Are Made." This bulletin describes and illustrates the company's method of making machine moulded gears.

McMyler-Interstate Co., Cleveland, Ohio, has recently published its new bulletin No. 68, describing and illustrating its No. 2 steam shovel. The bulletin gives complete details of the construction and convertible features of this shovel.

John A. Roebling's Sons Co., Trenton, N. J., publish a very neat pocket size handbook on wire and wire rope. This catalog gives the company's prices, data on wire products, helpful suggestions for selecting and handling wire rope and is well illustrated and bound with a good cover.

Besser Sales Co., Monadnock bldg., Chicago, exclusive distributors for Besser machinery and equipment for concrete products plants, have published two new supplements to their catalog, describing their new automatic stripper type block and tile machines.

Orton and Steinbrenner Co., Chicago, has published its catalog No. 25 illustrating and describing O. S. grab buckets. The various types of buckets manufactured by the company are presented in a lucid and concise manner, citing the particular features and applications of each one.

De La Vergne Machine Co., New York, has issued a little booklet entitled, "The Relation of Power Costs to Profits." It presents an interesting study in economics and gives some comparative figures on the costs of operation with electric current, steam and oil. In recommending De La Vergne oil engines as prime movers, simplicity, durability, continuity of operation, low maintenance cost and lowest labor cost are cited.

B. F. Goodrich Rubber Co., Akron, Ohio, has recently published a catalog on its various types of transmission and conveyor belts and their applications and particular features. This catalog is made up of individual sections, treating in a very enlightening and thorough manner separate or closely related products. These sections are numbered according to a key so that succeeding sections can be added to the catalog as published. The catalog is well written and attractively illustrated and contains much valuable information in a convenient form for those interested in belt conveyor and power transmission problems.

Statement of Ownership of Rock Products

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of ROCK PRODUCTS, published every other Saturday at 542 S. Dearborn St., Chicago, Ill., for April 1, 1925. State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared Nathan C. Rockwood, who, having been duly sworn according to law, deposes and says that he is the manager of ROCK PRODUCTS, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Tradepress Publishing Corp.; Editor, Edmund Shaw; Managing Editor, Nathan C. Rockwood; Business Manager, Nathan C. Rockwood.

2. That the owners of 1 per cent or more of the total amount of stock are: Tradepress Publishing Corp., W. D. Callender, T. J. Sullivan and Nathan C. Rockwood, all at 542 S. Dearborn St., Chicago, Ill.

3. That there are no bondholders, mortgagees, or other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

NATHAN C. ROCKWOOD,
Business Manager.

Sworn to and subscribed before me this 1st day of April, 1925.

(SEAL) CHARLES O. NELSON.
(My commission expires April 6, 1926.)